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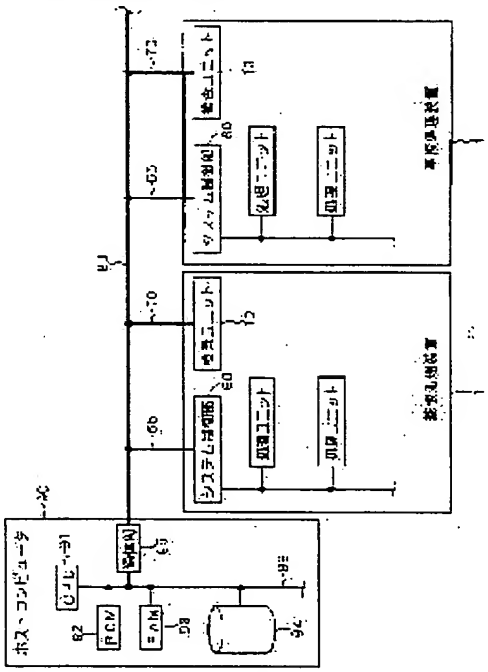
(54) SUBSTRATE PROCESSOR AND SUBSTRATE PROCESSING SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide substrate processing technique for reducing load on a communication line between substrate processors and exterior portion.
SOLUTION: Communication lines 65 for processors connect processing units of the substrate processors 1 with a host communication line 80, and data communication is performed between the processing units and a host computer 90 on the lines 64. Meanwhile, dedicated communication lines 70 for inspection units connect inspection units 10 with the host communication line 80, and the data communication is performed between the inspection units 10 and the host computer 90 on the lines 70. The dedicated communication lines 70 for the inspection units and the communication lines 65 for the processors and independently discretely installed. Therefore, inspection data obtained by means of the inspection units 10 can be directly transmitted to the host computer 90 via the dedicated communication lines 70 for the inspection units. Thus, the load on the communication lines 65 for the processors can be reduced.



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CLAIMS

[Claim(s)]
[Claim 1] It is the substrate processing system which connected to the substrate the substrate processor equipped with the processing section which performs predetermined processing, and the host computer with the host communication link line. Said substrate processor The 1st communication link line on which equip with the Banking Inspection Department which conducts predetermined inspection to a substrate, connect said Banking Inspection Department and said host communication link line to, and data communication is made to perform between said Banking Inspection Department and said host computers, The substrate processing system characterized by having the 2nd communication link line on which connect said processing section and said host communication link line to separately from said 1st communication link line independently, and data communication is made to perform between said processing sections and said host computers.
[Claim 2] The substrate processing system characterized by preparing the communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in said substrate processor in a substrate processing system according to claim 1.
[Claim 3] It is the substrate processor which is the substrate processor which equipped a substrate with the processing section which performs predetermined processing, and is characterized by to have the 2nd communication link line for being prepared independently and performing data communication between said processing sections and equipment exteriors the 1st communication link line and said 1st communication link line for performing data communication between the Banking Inspection Department which conducts predetermined inspection to a substrate, and said Banking Inspection Department and equipment exterior are separate in a line.
[Claim 4] The substrate processor characterized by having further a communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in a substrate processor according to claim 3.
[Claim 5] the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer with the host communication link line -- it is -- two or more of said processing sections -- respectively -- ** -- separate [to mutual] in said host communication link line -- independent -- connecting -- two or more of said processing sections -- respectively -- ** -- the substrate processing system characterized by to have two or more communication link lines which make data communication perform according to an individual between said host computers.
[Claim 6] It is the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer with the host communication link line. ashing as the washing section which performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host communication link line to, and data communication is made to perform between said washing sections and said host

computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host communication link line -- connecting -- said ashing -- the substrate processing system characterized by having the 2nd communication link line on which data communication is made to perform between the processing section and said host computer.

[Claim 7] the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer -- it is -- said two or more processing sections -- respectively -- ** -- separate [to mutual] in said host computer -- independent -- connecting -- said two or more processing sections -- respectively -- ** -- the substrate processing system characterized by having two or more communication link lines which make data communication perform according to an individual between said host computers.
[Claim 8] It is the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer. ashing as the washing section which performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host computer to, and data communication is made to perform between said washing sections and said host computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host computer -- connecting -- said ashing -- the substrate processing system characterized by having the 2nd communication link line on which data communication is made to perform between the processing section and said host computer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the substrate processing system which connected the substrate processor incorporating the Banking Inspection Department which conducts predetermined inspection, for example, the thickness measurement of a resist etc., to a semi-conductor substrate, the glass substrate for liquid crystal displays, the glass substrate for photo masks, the substrate for optical disks (a "substrate" is only called hereafter), etc., and its substrate processor and host computer with the host communication link line.
[0002]
[Description of the Prior Art] As everyone knows, products, such as a semi-conductor and a liquid crystal display, are manufactured by performing a series of processings of washing, resist spreading, exposure, development, etching, formation of an interlayer insulation film, heat treatment, dicing, etc. of many to the above-mentioned substrate. It is important to conduct various inspection of a substrate and to perform quality assurance after the process whose various above-mentioned processings settled, because of quality maintenance, such as this semi-conductor product.
[0003] For example, in the substrate processor (the so-called coater & developer) which performs resist spreading processing and a development, it is made to inspect line breadth measurement of the pattern on a substrate etc. in the final process of a development conventionally. The substrate which serves as a subject of examination at this time is once taken out from a substrate processor, and inspection will be presented after being carried in to the test equipment of the dedication prepared in another location. And the inspection result is fed back to a substrate processor, and adjustment of various processing conditions is performed.

[0004]
[The technique used as a background] However, in the former, since a substrate processor and test equipment were prepared independently, even test equipment had to carry the substrate used as a subject of examination, and the futility of time amount and an effort had arisen. Moreover, processing of the considerable number of a substrate paid out to equipment after the substrate concerned by the time the inspection result about a certain substrate became clear, since a certain amount of time amount was taken for an inspection result to become clear while the carrying-in time amount to test equipment was required was completed. For this reason, when nonconformity was in an inspection result, it will be necessary to perform reprocessing about the substrate of a considerable number, and processing effectiveness was to fall.
[0005] In order to solve such a problem, building test equipment into the interior of a substrate processor is considered. If test equipment is built into the interior of a substrate processor, since a substrate can be conveyed to test equipment with the carrier robot of a substrate processor, useless conveyance time amount can be omitted and an inspection result can be made to become clear to the inside of a short time. Therefore, even if nonconformity is in an inspection result, reprocessing can lessen required substrate number of sheets.
[0006] On the other hand, at the works which manufacture a semi-conductor etc., it is rare to

use a substrate processor independently, and it is used through a communication link line in many cases, connecting two or more substrate processors to a host computer. A host computer receives the inspection data sent from test equipment, and performs the analysis and judgment while it transmits the flow recipe which described procedure to each substrate processor.
[0007]
[Problem(s) to be Solved by the Invention] However, the communication link line between a substrate processor and a host computer was for the amount of the inspection data which test equipment generally transmits to be huge, and to be forced a great burden. Moreover, when a communication link trouble occurred between a host computer and a substrate processor, even if test equipment itself suited the condition that it could inspect, it was not able to transmit inspection data to a host computer.
[0008] Moreover, the equipment which included the plasma asher which performs resist clearance in the washing station which performs washing processing after ashing, and was unified by ashing (ashing processing) to which the chemical reaction of a resist and the oxygen plasma is carried out is also examined in order to abolish the useless time amount for conveyance between equipment in addition to test equipment. However, when two or more kinds of equipments which perform different processing in this way are unified, reconstruction of the software for controlling equipment is needed. That is, in the former, while the washing station was employed by the control software of dedication for washing processing, the plasma asher was employed by the control software of dedication for ashing, but when a plasma asher was carried, for example in a washing station, the integrated control software for employing the whole equipment which disclosed the software information on a plasma asher and was united with the washing station side needed to be reconstructed.
[0009] However, the control software of dedication for the object for washing processing which already has a track record, and ashing is abolished, and there is a problem of requiring a great effort and time amount in reconstruction of the new integrated control software.
[0010] This invention is made in view of the above-mentioned technical problem, and sets it as the 1st object to offer the substrate processing technique which can mitigate the communication link line load between a substrate processor and the exterior.
[0011] Moreover, it sets it as the 2nd object to offer the substrate processing technique in which the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can be employed.
[0012]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention of claim 1 In the substrate processing system which connected to the substrate the substrate processor equipped with the processing section which performs predetermined processing, and the host computer with the host communication link line The 1st communication link line on which equip said substrate processor with the Banking Inspection Department which conducts predetermined inspection to a substrate, connect said Banking Inspection Department and said host communication link line to it, and data communication is made to perform between said Banking Inspection Department and said host computers, Said processing section and said host communication link line were connected separately from said 1st communication link line independently, and it has the 2nd communication link line on which data communication is made to perform between said processing sections and said host computers.
[0013] Moreover, invention of claim 2 has prepared the communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in said substrate processor in the substrate processing system concerning invention of claim 1.
[0014] Moreover, invention of claim 3 was prepared separately [the 1st communication link line and said 1st communication link line for performing data communication between the Banking Inspection Department which conducts predetermined inspection to a substrate, and said Banking Inspection Department and equipment exterior] independently, and is equipped with the 2nd communication link line for performing data communication between said processing sections and equipment exteriors in the substrate processor which equipped the substrate with

the processing section which performs predetermined processing.
[0015] Moreover, invention of claim 4 is further equipped with the communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in the substrate processor concerning invention of claim 3.
[0016] Moreover, invention of claim 5 connected separately independently two or more of said each and said host communication link lines of the processing section mutually, and is equipped with two or more communication link lines which make data communication perform according to an individual between each of two or more of said processing sections, and said host computer in the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer with the host communication link line.
[0017] In the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer with the host communication link line moreover, ashing as the washing section to which invention of claim 6 performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host communication link line to, and data communication is made to perform between said washing sections and said host computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host communication link line -- connecting -- said ashing -- it has the 2nd communication link line on which data communication is made to perform between the processing section and said host computer.
[0018] Moreover, in the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer, invention of claim 7 connected separately independently two or more of said each and said host computers of the processing section mutually, and is equipped with two or more communication link lines which make data communication perform according to an individual between each of two or more of said processing sections, and said host computer.
[0019] In the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer moreover, ashing as the washing section to which invention of claim 8 performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host computer to, and data communication is made to perform between said washing sections and said host computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host computer -- connecting -- said ashing -- it has the 2nd communication link line on which data communication is made to perform between the processing section and said host computer.

[0020]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail, referring to a drawing.
[0021] <1. 1st operation gestalt> drawing 1 is the perspective view showing the outline of the whole substrate processor concerning this invention. Moreover, drawing 2 is the top view showing the outline configuration of this substrate processor 1. In addition, the XYZ rectangular coordinate system which makes Z shaft orientations the direction of a vertical in order to clarify those direction relation at drawing 1 and drawing 2 , and makes XY flat surface the level surface is attached. This substrate processor 1 is a substrate processor (the so-called coater & developer) which performs resist spreading processing and a development to Substrate W, is divided roughly and constituted by Indexer ID, and the unit arrangement section MP and Interface IFB.
[0022] Indexer ID is equipped with the transfer robot TF, the inspection units 10 and 20 (Banking Inspection Department), and the installation stage 30. Four carriers C can be arranged and laid in the installation stage 30 along a horizontal direction (Y shaft orientations). The receipt slot on multistage is engraved on each carrier C, and one substrate W can be held in a horizontal

position in each slot (making a principal plane meet the level surface). Therefore, on each carrier C, where it separated predetermined spacing to a horizontal position and multistage and the laminating of two or more substrates W (for example, 25 sheets) is carried out to them, it can contain. In addition, as a gestalt of Carrier C, you may be any of FOUP (front opening unified pod) which contains Substrate W to a closed space, or OC (open casette) which puts the receipt substrate W to the open air.

[0023] The transfer robot TF has one transfer arm, and can make making the rise-and-fall actuation of the transfer arm carry out in the height direction, carrying out revolution actuation, and a horizontal direction carry out attitude migration. Moreover, when transfer robot TF itself moves along the direction of Y, horizontal migration of the transfer arm can be carried out in accordance with Y shaft orientations. That is, the transfer robot TF can move a transfer arm in three dimension.

[0024] By actuation of such a transfer robot TF, Indexer ID can receive the substrate [finishing / processing] W from the unit arrangement section MP, and can contain it on Carrier C while it picks out the unsettled substrate W from the carrier C which can contain two or more substrates W and passes it to the unit arrangement section MP. Moreover, Indexer ID performs the taking-out close of the substrate W to the inspection unit 10 and the inspection unit 20 with the transfer robot TF.

[0025] The inspection unit 10 is an inspection unit (macroscopic defect inspection unit) which conducts macroscopic defect inspection. "Macroscopic defect inspection" is the comparatively big defect appeared on Substrate W, for example, inspection which judges the existence of adhesion of particle. On the other hand, the inspection unit 20 is an inspection unit which performs thickness measurement of a resist, line breadth measurement of a pattern, and superposition measurement of a pattern. That is, the inspection unit 20 can conduct three kinds of inspection in one inspection unit. "Thickness measurement of a resist" is inspection which measures the thickness of the resist applied on Substrate W. "Line breadth measurement of a pattern" is inspection which measures the line breadth of the pattern formed on Substrate W of exposure and a development. "Superposition measurement of a pattern" is inspection which measures a gap of the pattern formed on Substrate W of exposure and a development.

[0026] The inspection unit 10 and the inspection unit 20 are arranged by each in both corners of the interior upside of Indexer ID. More, when it sees from the upper part, the inspection unit 10 and the inspection unit 20 serve as relation included thoroughly into Indexer ID at accuracy (when it sees to the sense (- Z)).

[0027] Two or more arrangement of the processing unit which performs predetermined processing to Substrate W is carried out at the unit arrangement section MP. That is, two spreading processing units SC are arranged at the front-face side (-Y side) of the unit arrangement section MP. The spreading processing unit SC is the so-called spin coater which performs uniform resist spreading by dropping a photoresist at the substrate principal plane, rotating Substrate W.

[0028] Moreover, it is the tooth-back side (+Y side) of the unit arrangement section MP, and two development units SD are arranged in the same height location as the spreading processing unit SC. The development unit SD is the so-called spin developer who performs a development by supplying a developer on the substrate W after exposure. Opposite arrangement of the spreading processing unit SC and the development unit SD is carried out across the conveyance way 4.

[0029] In each upper part of two spreading processing units SC and two development units SD, the heat treatment unit group 5 is arranged on both sides of the fan filter unit which omits a graphic display (graphic display for convenience drawing 2 the heat treatment unit group 5 abbreviation). While cooling the so-called hot plate and so-called Substrate W which heat Substrate W and carry out temperature up even to predetermined temperature and lowering the temperature even to predetermined temperature, the so-called cool plate which maintains this substrate W to the predetermined temperature concerned is built into the heat treatment unit group 5. In addition, the BEKU unit after exposure which performs BEKU processing of the adhesion consolidation unit which performs adhesion consolidation processing to the substrate before resist spreading processing, and the substrate after exposure is contained in a hot plate.

On these descriptions, a hot plate and a cool plate are named generically, it considers as a heat treatment unit, the spreading processing unit SC, the development unit SD, and a heat treatment unit are named generically, and it considers as a processing unit (processing section).
[0030] The carrier robot TR is stationed on the conveyance way 4 across which it faced between the spreading processing unit SC and the development unit SD. The carrier robot TR has two conveyance arms, and can make attitude migration perform that you make it go up and down the conveyance arm along the direction of a vertical, making it rotate in the level surface, and in the level surface. Thereby, a carrier robot TR can do circulation conveyance of the substrate W according to predetermined procedure between each processing unit arranged at the unit arrangement section MP. Moreover, a carrier robot TR can deliver Substrate W also between the transfer robot TF of Indexer ID, and Interface IFB.
[0031] Interface IFB has the function which receives the substrate W after exposure from this aligner, and is returned to the unit arrangement section MP while it receives the substrate [finishing / resist spreading processing] W from the unit arrangement section MP and passes it to the aligner outside drawing (stepper). In order to realize this function, the delivery robot (graphic display abbreviation) for delivering Substrate W to Interface IFB is stationed. Moreover, in order to cancel the difference of the processing time in the unit arrangement section MP, and the processing time in an aligner for Interface IFB, the buffer section which contains Substrate W temporarily is also prepared.
[0032] Next, the processing in the substrate processor 1 which has the above-mentioned configuration is explained. First, the transfer robot TF of Indexer ID picks out the unsettled substrate W from Carrier C, and hands the carrier robot TR of the unit arrangement section MP. When taking out the unsettled substrate W, the transfer robot TF moves to the transverse plane of the carrier C which contained this substrate W, and a transfer arm is inserted under the substrate W. And the transfer robot TF raises a transfer arm a little, Substrate W is held, and the unsettled substrate W is taken out by making a transfer arm leave.
[0033] According to predetermined procedure, circulation conveyance of the substrate W passed to the unit arrangement section MP is carried out between each processing unit by the carrier robot TR. The substrate W which specifically performed resist spreading processing to the substrate W which performed adhesion consolidation processing, performed prebaking processing after that, and formed the resist film is passed to an aligner through Interface IFB. The substrate W which exposure processing ended is again returned to the unit arrangement section MP through Interface IFB from an aligner. A development is performed after performing BEKU processing after exposure to the substrate W after exposure. The substrate W which the development ended is passed to the transfer robot TF of Indexer ID from the carrier robot of the unit arrangement section MP, after BEKU processing is performed further. The transfer robot TF which received the substrate [finishing / processing] W contains the substrate W on Carrier C.
[0034] Although the above describes briefly the fundamental processing performed to Substrate W, in the substrate processor 1 of this operation gestalt, inspection of a substrate is also conducted within equipment. As for the thickness measurement of a resist, it is desirable among various inspection to carry out to the substrate W before carrying in to the aligner after prebaking. In this case, the substrate W which prebaking processing ended is once returned to Indexer ID from the unit arrangement section MP, and the transfer robot TF carries in this substrate W to the inspection unit 20. The substrate W which the thickness measurement of a resist ended will be again handed to the unit arrangement section MP by the transfer robot TF from the inspection unit 20, will be handed to Interface IFB from the carrier robot TR of the unit arrangement section MP, and will be carried in to an aligner.
[0035] Moreover, about macroscopic defect inspection, line breadth measurement of a pattern, and superposition measurement of a pattern, it is desirable to carry out to the substrate W which all processings were completed and has returned to Indexer ID. About macroscopic defect inspection, the transfer robot TF carries in to the inspection unit 10 the substrate W which all processings were completed and has returned to Indexer ID, and is made to perform it. The transfer robot TF carries in to the inspection unit 20 the substrate W which all processings were completed and has returned to Indexer ID about line breadth measurement of a pattern, and

superposition measurement of a pattern on the other hand, and is made to perform it. The substrate W with which inspection was completed in any case is contained by Carrier C with the transfer robot TF from the inspection unit 10 or the inspection unit 20.
[0036] A series of processings also including the above substrate inspection are realized according to the flow recipe which described procedure. With this operation gestalt, two or more substrate processors 1 arranged in a clean room etc. are connected to one set of a host computer, and a flow recipe is transmitted to each substrate processor 1 from this host computer.
[0037] Drawing 3 is the block diagram showing the outline configuration of the substrate processing system concerning this invention which connected the substrate processor 1 and the host computer. Each substrate processor 1 is the same as having been shown in drawing 1 R> 1 and drawing 2 . The processing unit prepared in the substrate processor 1 is the generic name of the spreading processing unit SC, the development unit SD, and a heat treatment unit, and the processing unit indicated to drawing 3 is also either of them. These processing unit, the carrier robot TR, and the transfer robot TF are controlled directly or indirectly by the system control section 60 by each. The system control section 60 is constituted by the computer built in the substrate processor 1, and is equipped with CPU for performing data processing, memory, a magnetic disk, etc.
[0038] The host computer 90 is equipped with CPU91 which is the body section and performs data processing, ROM92 which is read-only memory, RAM93 which is the memory which can be written, the magnetic disk 94 which memorizes the software for control, data, etc., and the communications department 95 which communicates between the substrate processors 1 etc. CPU91, and a magnetic disk 94 and communications department 95 grade are electrically connected through the bus line 99. And the host communication link line 80 is connected to the communications department 95.
[0039] As shown in drawing 3 , the host communication link line 80 and the system control section 60 of the substrate processor 1 are connected with the processor communication link line 65 (the 2nd communication link line). The flow recipe mentioned above is transmitted to the system control section 60 in order from a host computer 90 via the host communication link line 80 and the processor communication link line 65. The system control section 60 controls each processing unit, a carrier robot TR, etc. according to the transmitted flow recipe, and makes a series of processings which mentioned above perform to Substrate W. Moreover, the processed data in which the processing situation in each processing unit etc. is shown are transmitted to a host computer 90 in order through the system control section 60 via the processor communication link line 65 and the host communication link line 80 from each processing unit.
[0040] That is, the processor communication link line 65 is a circuit in which connect a processing unit and the host communication link line 80 to, and data communication is made to perform between a processing unit and a host computer 90.
[0041] On the other hand, the host communication link line 80 and the inspection unit 10 of the substrate processor 1 are connected with the inspection unit permanent communication line 70 (the 1st communication link line). It is prepared separately [the inspection unit permanent communication line 70 and the processor communication link line 65] independently. A host computer 90 makes it go via the host communication link line 80 and the inspection unit permanent communication line 70 in order, and transmits a parameter required for inspection etc. to the inspection unit 10. Moreover, the inspection data obtained in the inspection unit 10 are transmitted to a host computer 90 in order via the inspection unit permanent communication line 70 and the host communication link line 80. A host computer 90 performs the quality judging of the substrate which serves as a subject of examination based on the transmitted inspection data.
[0042] That is, the inspection unit permanent communication line 70 is a circuit in which connect the inspection unit 10 and the host communication link line 80 to, and data communication is made to perform between the inspection unit 10 and a host computer 90. And it is prepared separately [the inspection unit permanent communication line 70 and the processor communication link line 65] independently, and, as for a host computer 90, a processing unit, or

the inspection unit 10, data communication is performed according to an individual. In addition, although the graphic display is omitted in drawing 3 , he is trying to connect with the host communication link line 80 with a separate independent inspection unit permanent communication line like [unit / 20 / inspection] the inspection unit 10.
[0043] If it does in this way, since it can transmit to the direct host computer 90 by the inspection unit permanent communication line 70, without using the processor communication link line 65, the inspection data obtained in the inspection unit 10 can mitigate the load of the processor communication link line 65.
[0044] Moreover, using the inspection unit permanent communication line 70, even if a certain communication failure occurs according to the cause by the side of the substrate processor 1, since the communication link between the inspection unit 10 and a host computer 90 is possible, the function of the inspection unit 10 itself can be used effectively. That is, the substrate processor 1 can be used as test equipment at worst.
[0045] Moreover, since the interior of a substrate processor is equipped with the inspection unit 10 and the inspection unit 20, Substrate W can be inspected efficiently, the time amount required by inspection and judgment termination can be shortened, and a judgment result can be promptly fed back to the unit arrangement section MP.
[0046] As mentioned above, although the gestalt of operation of the 1st of this invention was explained, this invention is not limited to the above-mentioned example. For example, it is good even if [like drawing 4 for the configuration of a substrate processing system]. That the substrate processing system of drawing 4 is different from drawing 3 is the point of having formed the communication link line 75 in equipment for performing data communication between a processing unit and the inspection unit 10 in the substrate processor 1. In addition, about a residual point, it is the same as the substrate processing system of drawing 3 .
[0047] In the substrate processing system of drawing 4 , the inspection data obtained in the inspection unit 10 are transmitted to a host computer 90 in order via the inspection unit permanent communication line 70 and the host communication link line 80, and also it is transmitted to the system control section 60 via the communication link line 75 in equipment. Therefore, if inspection data can be directly grasped by the substrate processor 1 side and the inspection data-processing program is made to hold in the system control section 60, the quality judging of the substrate which serves as a direct subject of examination within the substrate processor 1 can also be performed.
[0048] Moreover, you may constitute so that two or more inspection units may be connected to a serial under the inspection unit permanent communication line 70.
[0049] Moreover, in the above-mentioned 1st operation gestalt, although he was trying to arrange two inspection units (the inspection unit 10 and inspection unit 20) inside Indexer ID, it may not be limited to this, and the number of inspection units may be one and they may be two or more. Moreover, it is not limited to the interior of Indexer ID, and the arrangement locations of an inspection unit may also be the unit arrangement section MP and the interior of Interface IFB, and you may make it attach them to the exterior of a substrate processor. And what is necessary is just to let each inspection unit be the inspection unit which conducts at least one or more kinds of inspection of the thickness measurement which measures the thickness of a resist, the line breadth measurement which measures the line breadth of a pattern, the superposition measurement which measures the superposition of a pattern, and the macroscopic defect inspection.
[0050] Moreover, in the above-mentioned 1st operation gestalt, although considered as the so-called single arm which equips the transfer robot TF of Indexer ID with one transfer arm, it is good also as the so-called gestalt of a double arm equipped with two transfer arms. If Indexer ID is equipped with an inspection unit, since the transfer robot's TF access frequency will naturally increase more than before, the conveyance effectiveness of direction used as the transfer robot TF having two transfer arms of Substrate W improves, and the throughput of a substrate processor improves.
[0051] Moreover, in the above-mentioned 1st operation gestalt, although the substrate processor was used as the equipment which performs resist spreading processing and a

development to a substrate and the function of an inspection unit was made into the gestalt which conducts inspection relevant to the so-called photolithography, the technique concerning this invention is not limited to this. For example, you may make it adopt the thing equipped with the checking feature which measures an amine or ammonia concentration as an inspection unit. Moreover, you may make it arrange the inspection unit which performs particle inspection to the substrate processors (the so-called spin scrubber etc.) from which the particle adhering to a substrate etc. is removed. Moreover, you may make it arrange the inspection unit which inspects the baking condition of the interlayer insulation film to the equipment which applies SOD (Spin-on-Dielectronics) to a substrate, and forms an interlayer insulation film. Furthermore, the substrate processed with other substrate processors is carried in, and after conducting the inspection, you may make it arrange an inspection unit to a substrate processor which acts to processing conditions as the feedforward of the inspection result. If the inspection unit permanent communication line linked to an inspection unit and the host communication link line 80 is prepared separately [the processor communication link line 65] independently even if it is which case, since it can transmit to the direct host computer 90 by the inspection unit permanent communication line, without using the processor communication link line 65, inspection data can mitigate the load of the processor communication link line 65.

[0052] The <2. 2nd operation gestalt>, next the 2nd operation gestalt of this invention are explained. Drawing 5 is the block diagram showing the substrate processing system of the 2nd operation gestalt. the equipment which performs washing processing of Substrate W with the 2nd operation gestalt although considered as the gestalt which connects to a host computer 90 the substrate processor 1 which carried the inspection units 10 and 20 in the equipment which performs resist spreading processing and a development to Substrate W with the 1st operation gestalt -- ashing -- the substrate processor 1a which carried the plasma asher which processes has connected to a host computer 90.

[0053] Since the configuration of a host computer 90 is the same as the 1st operation gestalt, the sign same about the same element is attached and the explanation is omitted. The same is said of the point that the host communication link line 80 is connected to the communications department 95.

[0054] Drawing 6 is the top view showing the configuration of substrate processor 1a. Drawing 7 is the sectional view seen along with the V-V line of drawing 6 . In addition, the XYZ rectangular coordinate system which makes Z shaft orientations the direction of a vertical if needed in order to clarify those direction relation also at drawing 6 and drawing 7 , and makes XY flat surface the level surface is attached. This substrate processor 1a is equipment which performs washing processing to that substrate succeedingly, after performing ashing to a substrate. substrate processor 1a -- Indexer IDA, the washing processing section 110, and ashing -- it has the processing section 120, a carrier robot TR, and the pars inflexa 150.

[0055] Indexer IDA is equipped with the transfer robot TF while it lays the carrier C which can contain two or more substrates, it picks out an unsettled substrate from the carrier C concerned, receives a processed substrate from a carrier robot TR, and holds it in Carrier C while paying out a carrier robot TR. The receipt slot on multistage is engraved on each carrier C, and one substrate W can be held in a horizontal position in each slot (making a principal plane meet the level surface). Therefore, on each carrier C, where it separated predetermined spacing to a horizontal position and multistage and the laminating of two or more substrates W (for example, 25 sheets) is carried out to them, it can contain. In addition, although FOUP (front opening unified pod) which contains Substrate W to a closed space is adopted as a gestalt of the carrier C of the 2nd operation gestalt, you may be OC (open casette) which is not limited to this and puts a SMIF (Standard Mechanical Inter Face) pod and the receipt substrate W to the open air.

[0056] The lid is formed in the transverse-plane side (inside (-X) side of drawing) of each carrier C, and it is covered removable with the lid concerned so that Substrate W can be taken in and out. Attachment and detachment of the lid of Carrier C are performed by the pod opener which omits a graphic display. The amount of covering device concerned becomes opening in which substrate passage is possible by removing a lid from Carrier C. Carrying-in taking out of

Substrate W to Carrier C is performed through this opening. In addition, AGV (Automatic Guided Vehicle), OHT (over-head hoist transport), etc. are usually made to perform installation to the indexer IDA of Carrier C, and taking out from Indexer IDA automatically.
[0057] The transfer robot TF can move the transfer arm 175 in three dimension like the 1st operation gestalt. Therefore, the transfer robot TF has thought that the unsettled substrate W is picked out from each carrier C, and the substrate [finishing / processing] W passes a carrier robot TR from the carrier robot TR, shifts, and can hold in that carrier C.
[0058] the washing processing section 110 and ashing -- opposite arrangement of the processing section 120 is carried out across the conveyance way 109 where the carrier robot TR has been stationed. Moreover, the end section of the conveyance way 109 contacts Indexer IDA, and the pars inflexa 150 is arranged at the other end.
[0059] The washing processing section 110 is equipped with the surface scrubber SS and every one rear-face scrubber SSR, respectively. It performs surface washing processing by breathing out a rinse (pure water) on the front face, and making a washing brush contact or approach it, the surface scrubber SS turning the front face (device side) of Substrate W to an upside, and rotating Substrate W in the level surface. The surface scrubber SS has adopted the so-called vacuum chuck which carries out vacuum adsorption of the rear face (a device side is a field of an opposite hand) of Substrate W.
[0060] On the other hand, it performs rear-face washing processing by breathing out a rinse (pure water) at the rear face, and making a washing brush contact or approach it, the rear-face scrubber SSR turning the rear face of Substrate W to an upside, and rotating Substrate W in the level surface. Since the rear-face scrubber SSR cannot carry out adsorption maintenance of the device side, the so-called MEKACHAKKU which grasps the periphery section of Substrate W has been used for it.
[0061] drawing 7 -- some rear-face scrubbers SSR -- the configuration is shown. Two or more pins 112 are set up by the top face of the revolution base 111. The pin 112 is arranged along with the periphery of the substrate W held, and the closing motion device in which a graphic display is omitted enables it to open and close it to Substrate W. That is, it is constituted so that a pin 112 may attach and detach to the periphery of Substrate W. When two or more pins 112 press in contact with the periphery section of Substrate W, the substrate W concerned is held in a horizontal position at the revolution base 111. On the other hand, while two or more pins 112 can pick out Substrate W from the revolution base 111 by taking the open position estranged from the periphery section of Substrate W, the new substrate W can be passed to the revolution base 111.
[0062] The revolution base 111 is supported by the motor 113 free [a revolution] centering on the revolving shaft which met in the direction of a vertical. When a motor 113 makes the revolution base 111 rotate the revolution base 111 in the condition of having made Substrate W holding, Substrate W will rotate in the level surface.
[0063] Moreover, the washing brush 114 and the pure-water regurgitation nozzle 116 are formed in the rear-face scrubber SSR. Free passage connection of the pure-water regurgitation nozzle 116 is made with the pure-water supply source outside drawing. The washing brush 114 is attached at the head of the brush arm 115. The brush arm 115 is made possible [going up and down with the drive outside drawing, and rocking in the level surface]. When performing rear-face washing processing of Substrate W, while rotating Substrate W, pollutants, such as particle adhering to the rear face of Substrate W, are removed by making the brush arm 115 rock in the condition of having made the washing brush 114 contacting or approaching the rear face of Substrate W, breathing out pure water as a rinse from the pure-water regurgitation nozzle 116 on the top face (rear face) of the substrate W. In addition, if the point that the surface scrubber SS has adopted the vacuum chuck is removed, it has the same configuration as the rear-face scrubber SSR.
[0064] ashing -- the processing section 120 makes the cool plate CP build in the ashing unit ASH, and is constituted. The ashing unit ASH is equipped with the processing room which connotes a plate 121 (drawing 7 R> 7), the vacuum system which carries out evacuation of the processing interior of a room, the raw gas feeder style which supplies raw gas, such as oxygen,

to a processing room, and the plasma molding machine style which impresses RF electric field and forms the plasma. By such configuration, the ashing unit ASH can make the circumference a vacuum, where Substrate W is laid on a plate 121, and the oxygen plasma can perform ashing (ashing processing). In addition, ashing is resist exfoliation processing which evaporates the resist which is the organic substance which consists of carbon, oxygen, and hydrogen by the oxygen plasma.

[0065] the substrate W which laid the cool plate CP built in the ashing unit ASH in the plate -- a Peltier device or constant temperature -- it cools to predetermined temperature by the water cycle. The cool plate CP here is for cooling even to the temperature which can washing process the substrate W which carried out temperature up by ashing.

[0066] it is shown in drawing 7 -- as -- the conveyance way 109 -- inserting -- the washing processing section 110 and ashing -- opposite arrangement of the processing section 120 is carried out in the same height location. in addition, the conveyance way 109, the washing processing section 110, and ashing -- the lower part space of the processing section 120 is functioning as a cabinet which contains liquid piping and electric wiring.

[0067] the washing processing section 110 and ashing -- the carrier robot TR is stationed in the center section of the conveyance way 109 put between the processing section 120. The carrier robot TR is the same as the 1st operation gestalt. therefore, the carrier robot TR -- Indexer ID, the washing processing section 10, and ashing -- ashing and washing processing can be made to perform to the substrate W concerned by delivering Substrate W between the processing section 20 and the pars inflexa 50

[0068] The pars inflexa 150 arranged at the edge of the conveyance way 109 carries out the laminating of the two reversal units REV1 and REV2 to two steps, and is constituted. The reversal units REV1 and REV2 all grasping the periphery section of Substrate W, and reversing the vertical side of a substrate is constituted possible. Although they have the same function, with this operation gestalt, the reversal units REV1 and REV2 are used in order that the reversal unit REV1 may turn the rear face of Substrate W to a top face, and in order that the reversal unit REV2 may turn the front face of Substrate W to a top face, they are used.

[0069] Here, the content of processing in substrate processor 1a of the 2nd operation gestalt is explained briefly. After performing pattern formation on the resist film in the production process of a semi-conductor and performing an ion implantation, since the resist film becomes unnecessary, resist exfoliation processing is performed. The processing for such resist exfoliation is ashing. Ashing is processing which evaporates the resist which is the organic substance by the oxygen plasma. However, some impurities which are not evaporated, such as heavy metal, are also contained in the actual resist, and such quality of survival has adhered to the substrate after ashing as particle. For this reason, washing processing is performed to the substrate after ashing. Then, formation of a protective coat etc. is performed and it finishes as a final product.

[0070] It is ashing and the washing processing which substrate processor 1a of the 2nd operation gestalt performs among the production processes of a semi-conductor. that is, ashing whose substrate processor 1a is washing processing and down stream processing in front of that -- processing is performed continuously.

[0071] If an example of the processing in substrate processor 1a is explained further, substrate processor 1a will be equipment which performs ashing and washing processing just behind that, and where the substrate [that the unnecessary resist film after an ion implantation has adhered] W is held in two or more sheet carrier C as an unsettled substrate, it will be carried in to the indexer IDA of substrate processor 1a.

[0072] Next, the transfer robot TF of Indexer IDA picks out one unsettled substrate W from Carrier C, and hands a carrier robot TR. the substrate W with which the carrier robot TR was passed from Indexer IDA -- ashing -- it carries in to the ashing unit ASH of the processing section 120. The ashing unit ASH lays Substrate W by sheet-like voice on a plate 121, and performs ashing. Since the substrate W after ashing has temperature too high for washing as it is, it is moved and cooled by the cool plate CP with a carrier robot TR.

[0073] then, the substrate W -- a carrier robot TR -- ashing -- it is carried in to the reversal

unit REV1 of the pars inflexa 150 from the processing section 120. The reversal unit REV1 reverses the vertical side of Substrate W, and uses a rear face as a top face. The substrate W by which vertical reversal was carried out is carried in to the rear-face scrubber SSR of the washing processing section 110 by the carrier robot TR with sheet-like voice. The rear-face scrubber SSR performs scrub washing of the rear face of Substrate W. The particle produced at the time of ashing turns to the rear face of Substrate W, and may adhere to it, and the rear-face scrubber SSR removes such particle.

[0074] Substrate W is carried in to the reversal unit REV2 of the pars inflexa 150 by the carrier robot TR from the washing processing section 110 after rear-face washing. The reversal unit REV2 reverses the vertical side of Substrate W, and uses a front face as a top face. The substrate W by which vertical reversal was carried out is carried in to the surface scrubber SS of the washing processing section 110 by the carrier robot TR with sheet-like voice. The surface scrubber SS performs scrub washing of the front face of Substrate W. The quality of survival after ashing has adhered to the front face of Substrate W as particle, and the surface scrubber SS removes such particle.

[0075] Substrate W is again returned to Indexer IDA by the carrier robot TR from the washing processing section 110 after surface washing. That is, the substrate [finishing / processing] W is passed to the transfer robot TF of Indexer IDA from a carrier robot TR, and the transfer robot TF contains the substrate W on Carrier C. The carrier C with which two or more substrates [finishing / processing] W were contained soon will be taken out from the indexer ID of substrate processor 1a.

[0076] In addition, the above is an example of the processing in substrate processor 1a, for example, after it performs surface washing previously, it may be made to perform rear-face washing.

[0077] as mentioned above -- this operation gestalt -- the washing processing section 110 and ashing -- the processing section 120 is unified and included in one substrate processor 1a. That is, substrate processor 1a unifies the washing station and plasma asher which were a separate isolated system conventionally. Even if it unifies a mechanical hardware configuration, it is as having mentioned already for it to be difficult, unification of software, i.e., reconstruction of the integrated control software. for this reason -- the 2nd operation gestalt -- the 1st operation gestalt -- the same -- the washing processing section 110 and ashing -- the processing section 120 -- respectively -- ** -- separate [to mutual] in the host communication link line 80 -- independent -- connecting -- the washing processing section 110 and ashing -- the processing section 120 -- respectively -- ** -- data communication is made to perform according to an individual between host computers 80

[0078] That is, as shown in drawing 5 , the host communication link line 80 and the control section 131 of the washing processing section 110 of substrate processor 1a are connected with the washing station communication link line 165 (the 1st communication link line). When making substrate processor 1a perform substrate processing in the substrate processing system of the 2nd operation gestalt, according to the flow recipe applied about a certain lot, a host computer 90 transmits a command to the control section 131 of the washing processing section 110 in order via the host communication link line 80 and the washing station communication link line 165. Procedure and processing conditions of Substrate W which were mentioned above are described to be "flow recipes."

[0079] A control section 131 controls Indexer IDA, a carrier robot TR, and the pars inflexa 150 in each device (for example, motor 113 of rear-face scrubber SSR) list which constitutes the washing processing section 110 according to the command transmitted from the host computer 90, and makes a series of washing processings perform to Substrate W. moreover, the inside of the processing section by which a control section 131 is contained in substrate processor 1a -- ashing -- the actual washing time amount in the equipment information SSR, for example, the rear-face scrubber, of the processing section other than processing section 120, the rotational frequency of Substrate W, etc. are acquired. The acquired equipment information is transmitted to a host computer 90 in order from a control section 131 via the washing station communication link line 165 and the host communication link line 80.

[0080] That is, the washing station communication link line 165 is a circuit in which connect the washing processing section 110 and the host communication link line 80 to, and data communication is made to perform between the washing processing section 110 and a host computer 90.
[0081] on the other hand -- ashing of the host communication link line 80 and substrate processor 1a -- the control section 132 of the processing section 120 -- ashing -- it connects with the processor communication link line 170 (the 2nd communication link line). ashing -- it is prepared separately [the processor communication link line 170 and the washing station communication link line 165] independently. a host computer 90 -- the host communication link line 80 and ashing -- the command which was made to go via the processor communication link line 170 in order, and followed the flow recipe, and ashing -- a parameter required for processing etc. -- ashing -- it transmits to the processing section 120.
[0082] moreover, the inside of the processing section by which a host computer 90 is contained in substrate processor 1a -- ashing -- the processing sections other than processing section 120, and ashing -- synchronizing with the processing section 120 is performed. for example, the carrier robot TR -- Substrate W -- ashing -- the time of carrying in to the ashing unit ASH of the processing section 120 -- a host computer 90 -- ashing -- initiation of ashing is directed to the control section 132 of the processing section 120. on the contrary, ashing -- when predetermined processing in the processing section 120 is completed, a host computer 90 directs initiation of washing processing to the control section 131 of the washing processing section 110. A control section 131,132 performs motion control (control of Indexer ID, the washing processing section 110, a carrier robot TR, and the pars inflexa 150) for motion control with original each, i.e., washing processing, and motion control for ashing (ashing control of the processing section 120) according to synchronizing of a host computer 90.
[0083] moreover, the control section 132 -- ashing -- the equipment information on the processing section 120, for example, the degree of vacuum and applied voltage of the processing interior of a room, is acquired. the acquired equipment information -- ashing from a control section 132 -- it is transmitted to a host computer 90 in order via the processor communication link line 170 and the host communication link line 80. The host computer 90 is stored in the magnetic-disk 94 grade by using as a database equipment information about substrate processor 1a transmitted from the control section 131,132.
[0084] namely, ashing -- the processor communication link line 170 -- ashing -- the processing section 120 and the host communication link line 80 -- connecting -- ashing -- it is the circuit in which data communication is made to perform between the processing section 120 and a host computer 90. and ashing -- it prepares separately [the processor communication link line 170 and the washing station communication link line 165] independently -- having -- a host computer 90, the washing processing section 110, and ashing -- as for the processing section 120, data communication is performed according to an individual.
[0085] thus -- if it carries out -- ashing -- the ** for which the data communication of the processing section 120 and a host computer 90 does not use the washing station communication link line 165 -- ashing -- since the processor communication link line 170 can perform, the load of the washing station communication link line 165 is mitigable.
[0086] moreover, a host computer 90, the washing processing section 110, and ashing -- the processing section 120 -- an individual exception -- connecting -- a host computer 90 -- ashing -- if synchronizing of the processing section 120 and the other processing section is made to perform, without it will reconstruct the integrated control software -- a simple configuration -- the washing processing section 110 and ashing -- substrate processor 1a equipped with the processing section 120 can be employed.
[0087] moreover, ashing which performs ashing which is the direct head end process of washing processing -- it is conveying, holding Substrate W by sheet-like voice with the carrier robot TR common in order of the washing processing section 110 which performs washing processing from the processing section 120. For this reason, the dead time which conveyance between equipment takes can be abolished.
[0088] Moreover, since washing processing of Substrate W will be comparatively performed after

ashing for a short time, the particle which remained after ashing cannot adhere to a substrate firmly, but can raise the washing processing engine performance.
[0089] As mentioned above, although the gestalt of operation of the 2nd of this invention was explained, this invention is not limited to the above-mentioned example. for example, the 2nd operation gestalt -- the washing station communication link line 165 and ashing -- although he was trying to connect the processor communication link line 170 to the host communication link line 80, respectively, it may be made to carry out direct continuation of these to a host computer 90, respectively. Drawing 8 is the block diagram showing other examples of the substrate processing system of the 2nd operation gestalt.
[0090] He is trying to establish two or more communication link ports in the communications department 95 of a host computer 90 about one substrate processor 1a in the system of drawing 8 . for this reason -- while carrying out direct continuation of the communications department 95 of a host computer 90, and the control section 131 of the washing processing section 110 of substrate processor 1a with the washing station communication link line 165 -- the communications department 95 and ashing -- the control section 132 of the processing section 120 -- ashing -- direct continuation is carried out with the processor communication link line 170. namely, the 2nd operation gestalt -- the same -- ashing -- it prepares separately [the processor communication link line 170 and the washing station communication link line 165] independently -- having -- a host computer 90, the washing processing section 110, and ashing -- as for the processing section 120, data communication is performed according to an individual. In addition, if the point that the topologies of a host computer 90 and substrate processor 1a differ is removed, a system configuration and the content of processing are the same as the above-mentioned 2nd operation gestalt.
[0091] thus -- even if it carries out -- ashing -- the ** for which the data communication of the processing section 120 and a host computer 90 does not use the washing station communication link line 165 -- ashing -- since the processor communication link line 170 can perform, the load of the washing station communication link line 165 is mitigable.
[0092] moreover, a host computer 90, the washing processing section 110, and ashing -- the processing section 120 -- an individual exception -- connecting -- a host computer 90 -- ashing -- if synchronizing of the processing section 120 and the other processing section is made to perform, without it will reconstruct the integrated control software -- a simple configuration -- the washing processing section 110 and ashing -- substrate processor 1a equipped with the processing section 120 can be employed.
[0093] moreover, the 2nd operation gestalt -- setting -- the washing processing section 110 and ashing -- although he was trying to include the processing section 120 in one substrate processor 1a, washing processing is performed two or more times in the production process of a semi-conductor etc., and you may make it incorporate the washing processing section 110 and other processing sections in one equipment For example, it unites with the membrane formation processing section which forms an oxide film, the etching processing section which performs etching of a substrate, and the washing processing section, and you may make it incorporate in the equipment of 1. That is, if the washing processing section which performs washing processing of a substrate, and the pretreatment section which perform processing applicable to the direct head end process of washing processing unify, it incorporates in the equipment of 1 and those each and host computers 90 connect with a separate independent communication link line, respectively, the substrate processor had two or more processing sections processing which is different with a simple configuration carries [sections] out like the 2nd operation gestalt can apply.
[0094] Moreover, two or more processing sections which perform not the thing limited to unifying the washing processing section and the processing section which performs the direct head end process of washing processing, and including in substrate processor 1a but different processing to which each does not follow a substrate are unified, and you may make it include in substrate processor 1a.
[0095] Furthermore, although the washing processing section 110 was used as the spin scrubber which performs mechanical washing with a washing brush in the 2nd operation gestalt Not the

thing limited to this but the unit which washes by spraying the pure water which gave the supersonic wave on a substrate, You may make it the unit which washes by spraying high-pressure pure water on a substrate, the unit which washes by mixing a gaseous phase to the liquid phase and spraying a substrate constitute the washing processing section.
[0096]
[Effect of the Invention] As mentioned above, the 1st communication link line on which according to invention of claim 1 connect the Banking Inspection Department and a host communication link line to, and data communication is made to perform between the Banking Inspection Department and a host computer as explained, In order to have the 2nd communication link line on which connect the processing section and a host communication link line to separately from the 1st communication link line independently, and data communication is made to perform between the processing section and a host computer, Without using the 2nd communication link line, by the 1st communication link line, it can transmit to a direct host computer and the inspection data which the Banking Inspection Department acquired can mitigate the communication link line load between a substrate processor and the exterior.
[0097] Moreover, since the communication link line in equipment for performing data communication between the processing section and the Banking Inspection Department is prepared in a substrate processor according to invention of claim 2, the inspection data which the Banking Inspection Department acquired can be directly grasped with a substrate processor.
[0098] Moreover, the 1st communication link line for performing data communication between the Banking Inspection Department and the equipment exterior according to invention of claim 3, In order to have the 2nd communication link line for [separate from the 1st communication link line] being prepared independently and performing data communication between the processing section and the equipment exterior, Without using the 2nd communication link line, by the 1st communication link line, it can transmit to the direct equipment exterior and the inspection data which the Banking Inspection Department acquired can mitigate the communication link line load between a substrate processor and the exterior.
[0099] Moreover, since it has a communication link line in equipment for performing data communication between the processing section and the Banking Inspection Department according to invention of claim 4, the inspection data which the Banking Inspection Department acquired can be directly grasped with a substrate processor.
[0100] moreover -- according to invention of claim 5 -- two or more processing sections -- respectively -- ** -- separate [to mutual] in a host communication link line -- independent -- connecting -- two or more processing sections -- respectively -- ** -- since it has two or more communication link lines which make data communication perform according to an individual between host computers, the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can apply, without reconstructing the integrated control software for controlling two or more whole processing sections.
[0101] Moreover, the 1st communication link line on which according to invention of claim 6 connect the washing section and a host communication link line to, and data communication is made to perform between the washing section and a host computer, separate from the 1st communication link line -- independent -- ashing -- the processing section and a host communication link line -- connecting -- ashing -- in order to have the 2nd communication link line on which data communication is made to perform between the processing section and a host computer -- a simple configuration -- the washing section and ashing -- the substrate processor equipped with the processing section can be employed.
[0102] moreover -- according to invention of claim 7 -- two or more processing sections -- respectively -- ** -- separate [to mutual] in a host computer -- independent -- connecting -- two or more processing sections -- respectively -- ** -- since it has two or more communication link lines which make data communication perform according to an individual between host computers, the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can employ, without reconstructing the integrated control software for controlling two or more whole

processing sections.
[0103] Moreover, the 1st communication link line on which according to invention of claim 8 connect the washing section and a host computer to and data communication is made to perform between the washing section and a host computer, separate from the 1st communication link line -- independent -- ashing -- the processing section and a host computer -- connecting -- ashing -- in order to have the 2nd communication link line on which data communication is made to perform between the processing section and a host computer -- a simple configuration -- the washing section and ashing -- the substrate processor equipped with the processing section can be employed.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the substrate processing system which connected the substrate processor incorporating the Banking Inspection Department which conducts predetermined inspection, for example, the thickness measurement of a resist etc., to a semi-conductor substrate, the glass substrate for liquid crystal displays, the glass substrate for photo masks, the substrate for optical disks (a "substrate" is only called hereafter), etc., and its substrate processor and host computer with the host communication link line.

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PRIOR ART

[Description of the Prior Art] As everyone knows, products, such as a semi-conductor and a liquid crystal display, are manufactured by performing a series of processings of washing, resist spreading, exposure, development, etching, formation of an interlayer insulation film, heat treatment, dicing, etc. of many to the above-mentioned substrate. It is important to conduct various inspection of a substrate and to perform quality assurance after the process whose various above-mentioned processings settled, because of quality maintenance, such as this semi-conductor product.
[0003] For example, in the substrate processor (the so-called coater & developer) which performs resist spreading processing and a development, it is made to inspect line breadth measurement of the pattern on a substrate etc. in the final process of a development conventionally. The substrate which serves as a subject of examination at this time is once taken out from a substrate processor, and inspection will be presented after being carried in to the test equipment of the dedication prepared in another location. And the inspection result is fed back to a substrate processor, and adjustment of various processing conditions is performed.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, the 1st communication link line on which according to invention of claim 1 connect the Banking Inspection Department and a host communication link line to, and data communication is made to perform between the Banking Inspection Department and a host computer as explained, In order to have the 2nd communication link line on which connect the processing section and a host communication link line to separately from the 1st communication link line independently, and data communication is made to perform between the processing section and a host computer, Without using the 2nd communication link line, by the 1st communication link line, it can transmit to a direct host computer and the inspection data which the Banking Inspection Department acquired can mitigate the communication link line load between a substrate processor and the exterior.
[0097] Moreover, since the communication link line in equipment for performing data communication between the processing section and the Banking Inspection Department is prepared in a substrate processor according to invention of claim 2, the inspection data which the Banking Inspection Department acquired can be directly grasped with a substrate processor.
[0098] Moreover, the 1st communication link line for performing data communication between the Banking Inspection Department and the equipment exterior according to invention of claim 3, In order to have the 2nd communication link line for [separate from the 1st communication link line] being prepared independently and performing data communication between the processing section and the equipment exterior, Without using the 2nd communication link line, by the 1st communication link line, it can transmit to the direct equipment exterior and the inspection data which the Banking Inspection Department acquired can mitigate the communication link line load between a substrate processor and the exterior.
[0099] Moreover, since it has a communication link line in equipment for performing data communication between the processing section and the Banking Inspection Department according to invention of claim 4, the inspection data which the Banking Inspection Department acquired can be directly grasped with a substrate processor.
[0100] moreover -- according to invention of claim 5 -- two or more processing sections -- respectively -- ** -- separate [to mutual] in a host communication link line -- independent -- connecting -- two or more processing sections -- respectively -- ** -- since it has two or more communication link lines which make data communication perform according to an individual between host computers, the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can apply, without reconstructing the integrated control software for controlling two or more whole processing sections.
[0101] Moreover, the 1st communication link line on which according to invention of claim 6 connect the washing section and a host communication link line to, and data communication is made to perform between the washing section and a host computer, separate from the 1st communication link line -- independent -- ashing -- the processing section and a host communication link line -- connecting -- ashing -- in order to have the 2nd communication link line on which data communication is made to perform between the processing section and a host computer -- a simple configuration -- the washing section and ashing -- the substrate

processor equipped with the processing section can be employed.
[0102] moreover -- according to invention of claim 7 -- two or more processing sections -- respectively -- ** -- separate [to mutual] in a host computer -- independent -- connecting -- two or more processing sections -- respectively -- ** -- since it has two or more communication link lines which make data communication perform according to an individual between host computers, the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can employ, without reconstructing the integrated control software for controlling two or more whole processing sections.
[0103] Moreover, the 1st communication link line on which according to invention of claim 8 connect the washing section and a host computer to and data communication is made to perform between the washing section and a host computer, separate from the 1st communication link line -- independent -- ashing -- the processing section and a host computer -- connecting -- ashing -- in order to have the 2nd communication link line on which data communication is made to perform between the processing section and a host computer -- a simple configuration -- the washing section and ashing -- the substrate processor equipped with the processing section can be employed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the communication link line between a substrate processor and a host computer was for the amount of the inspection data which test equipment generally transmits to be huge, and to be forced a great burden. Moreover, when a communication link trouble occurred between a host computer and a substrate processor, even if test equipment itself suited the condition that it could inspect, it was not able to transmit inspection data to a host computer.
[0008] Moreover, the equipment which included the plasma asher which performs resist clearance in the washing station which performs washing processing after ashing, and was unified by ashing (ashing processing) to which the chemical reaction of a resist and the oxygen plasma is carried out is also examined in order to abolish the useless time amount for conveyance between equipment in addition to test equipment. However, when two or more kinds of equipments which perform different processing in this way are unified, reconstruction of the software for controlling equipment is needed. That is, in the former, while the washing station was employed by the control software of dedication for washing processing, the plasma asher was employed by the control software of dedication for ashing, but when a plasma asher was carried, for example in a washing station, the integrated control software for employing the whole equipment which disclosed the software information on a plasma asher and was united with the washing station side needed to be reconstructed.
[0009] However, the control software of dedication for the object for washing processing which already has a track record, and ashing is abolished, and there is a problem of requiring a great effort and time amount in reconstruction of the new integrated control software.
[0010] This invention is made in view of the above-mentioned technical problem, and sets it as the 1st object to offer the substrate processing technique which can mitigate the communication link line load between a substrate processor and the exterior.
[0011] Moreover, it sets it as the 2nd object to offer the substrate processing technique in which the substrate processor equipped with two or more processing sections which perform processing which is different with a simple configuration can be employed.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention of claim 1 In the substrate processing system which connected to the substrate the substrate processor equipped with the processing section which performs predetermined processing, and the host computer with the host communication link line The 1st communication link line on which equip said substrate processor with the Banking Inspection Department which conducts predetermined inspection to a substrate, connect said Banking Inspection Department and said host communication link line to it, and data communication is made to perform between said Banking Inspection Department and said host computers, Said processing section and said host communication link line were connected separately from said 1st communication link line independently, and it has the 2nd communication link line on which data communication is made to perform between said processing sections and said host computers.
[0013] Moreover, invention of claim 2 has prepared the communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in said substrate processor in the substrate processing system concerning invention of claim 1.
[0014] Moreover, invention of claim 3 was prepared separately [the 1st communication link line and said 1st communication link line for performing data communication between the Banking Inspection Department which conducts predetermined inspection to a substrate, and said Banking Inspection Department and equipment exterior] independently, and is equipped with the 2nd communication link line for performing data communication between said processing sections and equipment exteriors in the substrate processor which equipped the substrate with the processing section which performs predetermined processing.
[0015] Moreover, invention of claim 4 is further equipped with the communication link line in equipment for performing data communication among said processing sections and said Banking Inspection Department in the substrate processor concerning invention of claim 3.
[0016] Moreover, invention of claim 5 connected separately independently two or more of said each and said host communication link lines of the processing section mutually, and is equipped with two or more communication link lines which make data communication perform according to an individual between each of two or more of said processing sections, and said host computer in the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer with the host communication link line.
[0017] In the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer with the host communication link line moreover, ashing as the washing section to which invention of claim 6 performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host communication link line to, and data communication is made to perform between said washing sections and said host computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host communication link line -- connecting -- said ashing -- it has the 2nd communication link line on which data

communication is made to perform between the processing section and said host computer.
[0018] Moreover, in the substrate processing system which connected the substrate processor equipped with two or more processing sections which perform processing from which each differs in a substrate, and the host computer, invention of claim 7 connected separately independently two or more of said each and said host computers of the processing section mutually, and is equipped with two or more communication link lines which make data communication perform according to an individual between each of two or more of said processing sections, and said host computer.
[0019] In the substrate processing system which connected the substrate processor equipped with the processing section, and the host computer moreover, ashing as the washing section to which invention of claim 8 performs washing processing to a substrate, and a direct head end process of said washing processing -- ashing which processes -- The 1st communication link line on which connect said washing section and said host computer to, and data communication is made to perform between said washing sections and said host computers, separate from said 1st communication link line -- independent -- said ashing -- the processing section and said host computer -- connecting -- said ashing -- it has the 2nd communication link line on which data communication is made to perform between the processing section and said host computer.

[0020]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail, referring to a drawing.
[0021] <1. 1st operation gestalt> drawing 1 is the perspective view showing the outline of the whole substrate processor concerning this invention. Moreover, drawing 2 is the top view showing the outline configuration of this substrate processor 1. In addition, the XYZ rectangular coordinate system which makes Z shaft orientations the direction of a vertical in order to clarify those direction relation at drawing 1 and drawing 2 , and makes XY flat surface the level surface is attached. This substrate processor 1 is a substrate processor (the so-called coater & developer) which performs resist spreading processing and a development to Substrate W, is divided roughly and constituted by Indexer ID, and the unit arrangement section MP and Interface IFB.
[0022] Indexer ID is equipped with the transfer robot TF, the inspection units 10 and 20 (Banking Inspection Department), and the installation stage 30. Four carriers C can be arranged and laid in the installation stage 30 along a horizontal direction (Y shaft orientations). The receipt slot on multistage is engraved on each carrier C, and one substrate W can be held in a horizontal position in each slot (making a principal plane meet the level surface). Therefore, on each carrier C, where it separated predetermined spacing to a horizontal position and multistage and the laminating of two or more substrates W (for example, 25 sheets) is carried out to them, it can contain. In addition, as a gestalt of Carrier C, you may be any of FOUP (front opening unified pod) which contains Substrate W to a closed space, or OC (open casette) which puts the receipt substrate W to the open air.
[0023] The transfer robot TF has one transfer arm, and can make making the rise-and-fall actuation of the transfer arm carry out in the height direction, carrying out revolution actuation, and a horizontal direction carry out attitude migration. Moreover, when transfer robot TF itself moves along the direction of Y, horizontal migration of the transfer arm can be carried out in accordance with Y shaft orientations. That is, the transfer robot TF can move a transfer arm in three dimension.
[0024] By actuation of such a transfer robot TF, Indexer ID can receive the substrate [finishing / processing] W from the unit arrangement section MP, and can contain it on Carrier C while it picks out the unsettled substrate W from the carrier C which can contain two or more substrates W and passes it to the unit arrangement section MP. Moreover, Indexer ID performs the taking-out close of the substrate W to the inspection unit 10 and the inspection unit 20 with the transfer robot TF.
[0025] The inspection unit 10 is an inspection unit (macroscopic defect inspection unit) which conducts macroscopic defect inspection. "Macroscopic defect inspection" is the comparatively

big defect appeared on Substrate W, for example, inspection which judges the existence of adhesion of particle. On the other hand, the inspection unit 20 is an inspection unit which performs thickness measurement of a resist, line breadth measurement of a pattern, and superposition measurement of a pattern. That is, the inspection unit 20 can conduct three kinds of inspection in one inspection unit. "Thickness measurement of a resist" is inspection which measures the thickness of the resist applied on Substrate W. "Line breadth measurement of a pattern" is inspection which measures the line breadth of the pattern formed on Substrate W of exposure and a development. "Superposition measurement of a pattern" is inspection which measures a gap of the pattern formed on Substrate W of exposure and a development.
[0026] The inspection unit 10 and the inspection unit 20 are arranged by each in both corners of the interior upside of Indexer ID. More, when it sees from the upper part, the inspection unit 10 and the inspection unit 20 serve as relation included thoroughly into Indexer ID at accuracy (when it sees to the sense (- Z)).
[0027] Two or more arrangement of the processing unit which performs predetermined processing to Substrate W is carried out at the unit arrangement section MP. That is, two spreading processing units SC are arranged at the front-face side (-Y side) of the unit arrangement section MP. The spreading processing unit SC is the so-called spin coater which performs uniform resist spreading by dropping a photoresist at the substrate principal plane, rotating Substrate W.
[0028] Moreover, it is the tooth-back side (+Y side) of the unit arrangement section MP, and two development units SD are arranged in the same height location as the spreading processing unit SC. The development unit SD is the so-called spin developer who performs a development by supplying a developer on the substrate W after exposure. Opposite arrangement of the spreading processing unit SC and the development unit SD is carried out across the conveyance way 4.
[0029] In each upper part of two spreading processing units SC and two development units SD, the heat treatment unit group 5 is arranged on both sides of the fan filter unit which omits a graphic display (graphic display for convenience drawing 2 the heat treatment unit group 5 . abbreviation). While cooling the so-called hot plate and so-called Substrate W which heat Substrate W and carry out temperature up even to predetermined temperature and lowering the temperature even to predetermined temperature, the so-called cool plate which maintains this substrate W to the predetermined temperature concerned is built into the heat treatment unit group 5. In addition, the BEKU unit after exposure which performs BEKU processing of the adhesion consolidation unit which performs adhesion consolidation processing to the substrate before resist spreading processing, and the substrate after exposure is contained in a hot plate. On these descriptions, a hot plate and a cool plate are named generically, it considers as a heat treatment unit, the spreading processing unit SC, the development unit SD, and a heat treatment unit are named generically, and it considers as a processing unit (processing section).
[0030] The carrier robot TR is stationed on the conveyance way 4 across which it faced between the spreading processing unit SC and the development unit SD. The carrier robot TR has two conveyance arms, and can make attitude migration perform that you make it go up and down the conveyance arm along the direction of a vertical, making it rotate in the level surface, and in the level surface. Thereby, a carrier robot TR can do circulation conveyance of the substrate W according to predetermined procedure between each processing unit arranged at the unit arrangement section MP. Moreover, a carrier robot TR can deliver Substrate W also between the transfer robot TF of Indexer ID, and Interface IFB.
[0031] Interface IFB has the function which receives the substrate W after exposure from this aligner, and is returned to the unit arrangement section MP while it receives the substrate [finishing / resist spreading processing] W from the unit arrangement section MP and passes it to the aligner outside drawing (stepper). In order to realize this function, the delivery robot (graphic display abbreviation) for delivering Substrate W to Interface IFB is stationed. Moreover, in order to cancel the difference of the processing time in the unit arrangement section MP, and the processing time in an aligner for Interface IFB, the buffer section which contains Substrate W temporarily is also prepared.
[0032] Next, the processing in the substrate processor 1 which has the above-mentioned

configuration is explained. First, the transfer robot TF of Indexer ID picks out the unsettled substrate W from Carrier C, and hands the carrier robot TR of the unit arrangement section MP. When taking out the unsettled substrate W, the transfer robot TF moves to the transverse plane of the carrier C which contained this substrate W, and a transfer arm is inserted under the substrate W. And the transfer robot TF raises a transfer arm a little, Substrate W is held, and the unsettled substrate W is taken out by making a transfer arm leave.

[0033] According to predetermined procedure, circulation conveyance of the substrate W passed to the unit arrangement section MP is carried out between each processing unit by the carrier robot TR. The substrate W which specifically performed resist spreading processing to the substrate W which performed adhesion consolidation processing, performed prebaking processing after that, and formed the resist film is passed to an aligner through Interface IFB. The substrate W which exposure processing ended is again returned to the unit arrangement section MP through Interface IFB from an aligner. A development is performed after performing BEKU processing after exposure to the substrate W after exposure. The substrate W which the development ended is passed to the transfer robot TF of Indexer ID from the carrier robot of the unit arrangement section MP, after BEKU processing is performed further. The transfer robot TF which received the substrate [finishing / processing] W contains the substrate W on Carrier C.

[0034] Although the above describes briefly the fundamental processing performed to Substrate W, in the substrate processor 1 of this operation gestalt, inspection of a substrate is also conducted within equipment. As for the thickness measurement of a resist, it is desirable among various inspection to carry out to the substrate W before carrying in to the aligner after prebaking. In this case, the substrate W which prebaking processing ended is once returned to Indexer ID from the unit arrangement section MP, and the transfer robot TF carries in this substrate W to the inspection unit 20. The substrate W which the thickness measurement of a resist ended will be again handed to the unit arrangement section MP by the transfer robot TF from the inspection unit 20, will be handed to Interface IFB from the carrier robot TR of the unit arrangement section MP, and will be carried in to an aligner.

[0035] Moreover, about macroscopic defect inspection, line breadth measurement of a pattern, and superposition measurement of a pattern, it is desirable to carry out to the substrate W which all processings were completed and has returned to Indexer ID. About macroscopic defect inspection, the transfer robot TF carries in to the inspection unit 10 the substrate W which all processings were completed and has returned to Indexer ID, and is made to perform it. The transfer robot TF carries in to the inspection unit 20 the substrate W which all processings were completed and has returned to Indexer ID about line breadth measurement of a pattern, and superposition measurement of a pattern on the other hand, and is made to perform it. The substrate W with which inspection was completed in any case is contained by Carrier C with the transfer robot TF from the inspection unit 10 or the inspection unit 20.

[0036] A series of processings also including the above substrate inspection are realized according to the flow recipe which described procedure. With this operation gestalt, two or more substrate processors 1 arranged in a clean room etc. are connected to one set of a host computer, and a flow recipe is transmitted to each substrate processor 1 from this host computer.

[0037] Drawing 3 is the block diagram showing the outline configuration of the substrate processing system concerning this invention which connected the substrate processor 1 and the host computer. Each substrate processor 1 is the same as having been shown in drawing 1 R> 1 and drawing 2 . The processing unit prepared in the substrate processor 1 is the generic name of the spreading processing unit SC, the development unit SD, and a heat treatment unit, and the processing unit indicated to drawing 3 is also either of them. These processing unit, the carrier robot TR, and the transfer robot TF are controlled directly or indirectly by the system control section 60 by each. The system control section 60 is constituted by the computer built in the substrate processor 1, and is equipped with CPU for performing data processing, memory, a magnetic disk, etc.

[0038] The host computer 90 is equipped with CPU91 which is the body section and performs data processing, ROM92 which is read-only memory, RAM93 which is the memory which can be

written, the magnetic disk 94 which memorizes the software for control, data, etc., and the communications department 95 which communicates between the substrate processors 1 etc. CPU91, and a magnetic disk 94 and communications department 95 grade are electrically connected through the bus line 99. And the host communication link line 80 is connected to the communications department 95.

[0039] As shown in drawing 3 , the host communication link line 80 and the system control section 60 of the substrate processor 1 are connected with the processor communication link line 65 (the 2nd communication link line). The flow recipe mentioned above is transmitted to the system control section 60 in order from a host computer 90 via the host communication link line 80 and the processor communication link line 65. The system control section 60 controls each processing unit, a carrier robot TR, etc. according to the transmitted flow recipe, and makes a series of processings which mentioned above perform to Substrate W. Moreover, the processed data in which the processing situation in each processing unit etc. is shown are transmitted to a host computer 90 in order through the system control section 60 via the processor communication link line 65 and the host communication link line 80 from each processing unit.

[0040] That is, the processor communication link line 65 is a circuit in which connect a processing unit and the host communication link line 80 to, and data communication is made to perform between a processing unit and a host computer 90.

[0041] On the other hand, the host communication link line 80 and the inspection unit 10 of the substrate processor 1 are connected with the inspection unit permanent communication line 70 (the 1st communication link line). It is prepared separately [the inspection unit permanent communication line 70 and the processor communication link line 65] independently. A host computer 90 makes it go via the host communication link line 80 and the inspection unit permanent communication line 70 in order, and transmits a parameter required for inspection etc. to the inspection unit 10. Moreover, the inspection data obtained in the inspection unit 10 are transmitted to a host computer 90 in order via the inspection unit permanent communication line 70 and the host communication link line 80. A host computer 90 performs the quality judging of the substrate which serves as a subject of examination based on the transmitted inspection data.

[0042] That is, the inspection unit permanent communication line 70 is a circuit in which connect the inspection unit 10 and the host communication link line 80 to, and data communication is made to perform between the inspection unit 10 and a host computer 90. And it is prepared separately [the inspection unit permanent communication line 70 and the processor communication link line 65] independently, and, as for a host computer 90, a processing unit, or the inspection unit 10, data communication is performed according to an individual. In addition, although the graphic display is omitted in drawing 3 , he is trying to connect with the host communication link line 80 with a separate independent inspection unit permanent communication line like [unit / 20 / inspection] the inspection unit 10.

[0043] If it does in this way, since it can transmit to the direct host computer 90 by the inspection unit permanent communication line 70, without using the processor communication link line 65, the inspection data obtained in the inspection unit 10 can mitigate the load of the processor communication link line 65.

[0044] Moreover, using the inspection unit permanent communication line 70, even if a certain communication failure occurs according to the cause by the side of the substrate processor 1, since the communication link between the inspection unit 10 and a host computer 90 is possible, the function of the inspection unit 10 itself can be used effectively. That is, the substrate processor 1 can be used as test equipment at worst.

[0045] Moreover, since the interior of a substrate processor is equipped with the inspection unit 10 and the inspection unit 20, Substrate W can be inspected efficiently, the time amount required by inspection and judgment termination can be shortened, and a judgment result can be promptly fed back to the unit arrangement section MP.

[0046] As mentioned above, although the gestalt of operation of the 1st of this invention was explained, this invention is not limited to the above-mentioned example. For example, it is good even if [like drawing 4 for the configuration of a substrate processing system]. That the

substrate processing system of drawing 4 is different from drawing 3 is the point of having formed the communication link line 75 in equipment for performing data communication between a processing unit and the inspection unit 10 in the substrate processor 1. In addition, about a residual point, it is the same as the substrate processing system of drawing 3 .
[0047] In the substrate processing system of drawing 4 , the inspection data obtained in the inspection unit 10 are transmitted to a host computer 90 in order via the inspection unit permanent communication line 70 and the host communication link line 80, and also it is transmitted to the system control section 60 via the communication link line 75 in equipment. Therefore, if inspection data can be directly grasped by the substrate processor 1 side and the inspection data-processing program is made to hold in the system control section 60, the quality judging of the substrate which serves as a direct subject of examination within the substrate processor 1 can also be performed.
[0048] Moreover, you may constitute so that two or more inspection units may be connected to a serial under the inspection unit permanent communication line 70.
[0049] Moreover, in the above-mentioned 1st operation gestalt, although he was trying to arrange two inspection units (the inspection unit 10 and inspection unit 20) inside Indexer ID, it may not be limited to this, and the number of inspection units may be one and they may be two or more. Moreover, it is not limited to the interior of Indexer ID, and the arrangement locations of an inspection unit may also be the unit arrangement section MP and the interior of Interface IFB, and you may make it attach them to the exterior of a substrate processor. And what is necessary is just to let each inspection unit be the inspection unit which conducts at least one or more kinds of inspection of the thickness measurement which measures the thickness of a resist, the line breadth measurement which measures the line breadth of a pattern, the superposition measurement which measures the superposition of a pattern, and the macroscopic defect inspection.
[0050] Moreover, in the above-mentioned 1st operation gestalt, although considered as the so-called single arm which equips the transfer robot TF of Indexer ID with one transfer arm, it is good also as the so-called gestalt of a double arm equipped with two transfer arms. If Indexer ID is equipped with an inspection unit, since the transfer robot's TF access frequency will naturally increase more than before, the conveyance effectiveness of direction used as the transfer robot TF having two transfer arms of Substrate W improves, and the throughput of a substrate processor improves.
[0051] Moreover, in the above-mentioned 1st operation gestalt, although the substrate processor was used as the equipment which performs resist spreading processing and a development to a substrate and the function of an inspection unit was made into the gestalt which conducts inspection relevant to the so-called photolithography, the technique concerning this invention is not limited to this. For example, you may make it adopt the thing equipped with the checking feature which measures an amine or ammonia concentration as an inspection unit. Moreover, you may make it arrange the inspection unit which performs particle inspection to the substrate processors (the so-called spin scrubber etc.) from which the particle adhering to a substrate etc. is removed. Moreover, you may make it arrange the inspection unit which inspects the baking condition of the interlayer insulation film to the equipment which applies SOD (Spin-on-Dielectronics) to a substrate, and forms an interlayer insulation film. Furthermore, the substrate processed with other substrate processors is carried in, and after conducting the inspection, you may make it arrange an inspection unit to a substrate processor which acts to processing conditions as the feedforward of the inspection result. If the inspection unit permanent communication line linked to an inspection unit and the host communication link line 80 is prepared separately [the processor communication link line 65] independently even if it is which case, since it can transmit to the direct host computer 90 by the inspection unit permanent communication line, without using the processor communication link line 65, inspection data can mitigate the load of the processor communication link line 65.
[0052] The <2. 2nd operation gestalt>, next the 2nd operation gestalt of this invention are explained. Drawing 5 is the block diagram showing the substrate processing system of the 2nd operation gestalt. the equipment which performs washing processing of Substrate W with the 2nd

operation gestalt although considered as the gestalt which connects to a host computer 90 the substrate processor 1 which carried the inspection units 10 and 20 in the equipment which performs resist spreading processing and a development to Substrate W with the 1st operation gestalt — ashing — the substrate processor 1a which carried the plasma asher which processes has connected to a host computer 90.

[0053] Since the configuration of a host computer 90 is the same as the 1st operation gestalt, the sign same about the same element is attached and the explanation is omitted. The same is said of the point that the host communication link line 80 is connected to the communications department 95.

[0054] Drawing 6 is the top view showing the configuration of substrate processor 1a. Drawing 7 is the sectional view seen along with the V-V line of drawing 6 . In addition, the XYZ rectangular coordinate system which makes Z shaft orientations the direction of a vertical if needed in order to clarify those direction relation also at drawing 6 and drawing 7 , and makes XY flat surface the level surface is attached. This substrate processor 1a is equipment which performs washing processing to that substrate succeedingly, after performing ashing to a substrate. substrate processor 1a — Indexer IDA, the washing processing section 110, and ashing — it has the processing section 120, a carrier robot TR, and the pars inflexa 150.

[0055] Indexer IDA is equipped with the transfer robot TF while it lays the carrier C which can contain two or more substrates, it picks out an unsettled substrate from the carrier C concerned, receives a processed substrate from a carrier robot TR, and holds it in Carrier C while paying out a carrier robot TR. The receipt slot on multistage is engraved on each carrier C, and one substrate W can be held in a horizontal position in each slot (making a principal plane meet the level surface). Therefore, on each carrier C, where it separated predetermined spacing to a horizontal position and multistage and the laminating of two or more substrates W (for example, 25 sheets) is carried out to them, it can contain. In addition, although FOUP (front opening unified pod) which contains Substrate W to a closed space is adopted as a gestalt of the carrier C of the 2nd operation gestalt, you may be OC (open casette) which is not limited to this and puts a SMIF (Standard Mechanical Inter Face) pod and the receipt substrate W to the open air.

[0056] The lid is formed in the transverse-plane side (inside (-X) side of drawing) of each carrier C, and it is covered removable with the lid concerned so that Substrate W can be taken in and out. Attachment and detachment of the lid of Carrier C are performed by the pod opener which omits a graphic display. The amount of covering device concerned becomes opening in which substrate passage is possible by removing a lid from Carrier C. Carrying-in taking out of Substrate W to Carrier C is performed through this opening. In addition, AGV (Automatic Guided Vehicle), OHT (over-head hoist transport), etc. are usually made to perform installation to the indexer IDA of Carrier C, and taking out from Indexer IDA automatically.

[0057] The transfer robot TF can move the transfer arm 175 in three dimension like the 1st operation gestalt. Therefore, the transfer robot TF has thought that the unsettled substrate W is picked out from each carrier C, and the substrate [finishing / processing] W passes a carrier robot TR from the carrier robot TR, shifts, and can hold in that carrier C.

[0058] the washing processing section 110 and ashing — opposite arrangement of the processing section 120 is carried out across the conveyance way 109 where the carrier robot TR has been stationed. Moreover, the end section of the conveyance way 109 contacts Indexer IDA, and the pars inflexa 150 is arranged at the other end.

[0059] The washing processing section 110 is equipped with the surface scrubber SS and every one rear-face scrubber SSR, respectively. It performs surface washing processing by breathing out a rinse (pure water) on the front face, and making a washing brush contact or approach it, the surface scrubber SS turning the front face (device side) of Substrate W to an upside, and rotating Substrate W in the level surface. The surface scrubber SS has adopted the so-called vacuum chuck which carries out vacuum adsorption of the rear face (a device side is a field of an opposite hand) of Substrate W.

[0060] On the other hand, it performs rear-face washing processing by breathing out a rinse (pure water) at the rear face, and making a washing brush contact or approach it, the rear-face

scrubber SSR turning the rear face of Substrate W to an upside, and rotating Substrate W in the level surface. Since the rear-face scrubber SSR cannot carry out adsorption maintenance of the device side, the so-called MEKACHAKKU which grasps the periphery section of Substrate W has been used for it.

[0061] drawing 7 -- some rear-face scrubbers SSR -- the configuration is shown. Two or more pins 112 are set up by the top face of the revolution base 111. The pin 112 is arranged along with the periphery of the substrate W held, and the closing motion device in which a graphic display is omitted enables it to open and close it to Substrate W. That is, it is constituted so that a pin 112 may attach and detach to the periphery of Substrate W. When two or more pins 112 press in contact with the periphery section of Substrate W, the substrate W concerned is held in a horizontal position at the revolution base 111. On the other hand, while two or more pins 112 can pick out Substrate W from the revolution base 111 by taking the open position estranged from the periphery section of Substrate W, the new substrate W can be passed to the revolution base 111.

[0062] The revolution base 111 is supported by the motor 113 free [a revolution] centering on the revolving shaft which met in the direction of a vertical. When a motor 113 makes the revolution base 111 rotate the revolution base 111 in the condition of having made Substrate W holding, Substrate W will rotate in the level surface.

[0063] Moreover, the washing brush 114 and the pure-water regurgitation nozzle 116 are formed in the rear-face scrubber SSR. Free passage connection of the pure-water regurgitation nozzle 116 is made with the pure-water supply source outside drawing. The washing brush 114 is attached at the head of the brush arm 115. The brush arm 115 is made possible [going up and down with the drive outside drawing, and rocking in the level surface]. When performing rear-face washing processing of Substrate W, while rotating Substrate W, pollutants, such as particle adhering to the rear face of Substrate W, are removed by making the brush arm 115 rock in the condition of having made the washing brush 114 contacting or approaching the rear face of Substrate W, breathing out pure water as a rinse from the pure-water regurgitation nozzle 116 on the top face (rear face) of the substrate W. In addition, if the point that the surface scrubber SS has adopted the vacuum chuck is removed, it has the same configuration as the rear-face scrubber SSR.

[0064] ashing -- the processing section 120 makes the cool plate CP build in the ashing unit ASH, and is constituted. The ashing unit ASH is equipped with the processing room which connotes a plate 121 (drawing 7 R> 7), the vacuum system which carries out evacuation of the processing interior of a room, the raw gas feeder style which supplies raw gas, such as oxygen, to a processing room, and the plasma molding machine style which impresses RF electric field and forms the plasma. By such configuration, the ashing unit ASH can make the circumference a vacuum, where Substrate W is laid on a plate 121, and the oxygen plasma can perform ashing (ashing processing). In addition, ashing is resist exfoliation processing which evaporates the resist which is the organic substance which consists of carbon, oxygen, and hydrogen by the oxygen plasma.

[0065] the substrate W which laid the cool plate CP built in the ashing unit ASH in the plate -- a Peltier device or constant temperature -- it cools to predetermined temperature by the water cycle. The cool plate CP here is for cooling even to the temperature which can washing process the substrate W which carried out temperature up by ashing.

[0066] it is shown in drawing 7 -- as -- the conveyance way 109 -- inserting -- the washing processing section 110 and ashing -- opposite arrangement of the processing section 120 is carried out in the same height location. in addition, the conveyance way 109, the washing processing section 110, and ashing -- the lower part space of the processing section 120 is functioning as a cabinet which contains liquid piping and electric wiring.

[0067] the washing processing section 110 and ashing -- the carrier robot TR is stationed in the center section of the conveyance way 109 put between the processing section 120. The carrier robot TR is the same as the 1st operation gestalt. therefore, the carrier robot TR -- Indexer ID, the washing processing section 10, and ashing -- ashing and washing processing can be made to perform to the substrate W concerned by delivering Substrate W between the processing section

20 and the pars inflexa 50
[0068] The pars inflexa 150 arranged at the edge of the conveyance way 109 carries out the laminating of the two reversal units REV1 and REV2 to two steps, and is constituted. The reversal units REV1 and REV2 all grasping the periphery section of Substrate W, and reversing the vertical side of a substrate is constituted possible. Although they have the same function, with this operation gestalt, the reversal units REV1 and REV2 are used in order that the reversal unit REV1 may turn the rear face of Substrate W to a top face, and in order that the reversal unit REV2 may turn the front face of Substrate W to a top face, they are used.
[0069] Here, the content of processing in substrate processor 1a of the 2nd operation gestalt is explained briefly. After performing pattern formation on the resist film in the production process of a semi-conductor and performing an ion implantation, since the resist film becomes unnecessary, resist exfoliation processing is performed. The processing for such resist exfoliation is ashing. Ashing is processing which evaporates the resist which is the organic substance by the oxygen plasma. However, some impurities which are not evaporated, such as heavy metal, are also contained in the actual resist, and such quality of survival has adhered to the substrate after ashing as particle. For this reason, washing processing is performed to the substrate after ashing. Then, formation of a protective coat etc. is performed and it finishes as a final product.
[0070] It is ashing and the washing processing which substrate processor 1a of the 2nd operation gestalt performs among the production processes of a semi-conductor. that is, ashing whose substrate processor 1a is washing processing and down stream processing in front of that -- processing is performed continuously.
[0071] If an example of the processing in substrate processor 1a is explained further, substrate processor 1a will be equipment which performs ashing and washing processing just behind that, and where the substrate [that the unnecessary resist film after an ion implantation has adhered] W is held in two or more sheet carrier C as an unsettled substrate, it will be carried in to the indexer IDA of substrate processor 1a.
[0072] Next, the transfer robot TF of Indexer IDA picks out one unsettled substrate W from Carrier C, and hands a carrier robot TR. the substrate W with which the carrier robot TR was passed from Indexer IDA -- ashing -- it carries in to the ashing unit ASH of the processing section 120. The ashing unit ASH lays Substrate W by sheet-like voice on a plate 121, and performs ashing. Since the substrate W after ashing has temperature too high for washing as it is, it is moved and cooled by the cool plate CP with a carrier robot TR.
[0073] then, the substrate W -- a carrier robot TR -- ashing -- it is carried in to the reversal unit REV1 of the pars inflexa 150 from the processing section 120. The reversal unit REV1 reverses the vertical side of Substrate W, and uses a rear face as a top face. The substrate W by which vertical reversal was carried out is carried in to the rear-face scrubber SSR of the washing processing section 110 by the carrier robot TR with sheet-like voice. The rear-face scrubber SSR performs scrub washing of the rear face of Substrate W. The particle produced at the time of ashing turns to the rear face of Substrate W, and may adhere to it, and the rear-face scrubber SSR removes such particle.
[0074] Substrate W is carried in to the reversal unit REV2 of the pars inflexa 150 by the carrier robot TR from the washing processing section 110 after rear-face washing. The reversal unit REV2 reverses the vertical side of Substrate W, and uses a front face as a top face. The substrate W by which vertical reversal was carried out is carried in to the surface scrubber SS of the washing processing section 110 by the carrier robot TR with sheet-like voice. The surface scrubber SS performs scrub washing of the front face of Substrate W. The quality of survival after ashing has adhered to the front face of Substrate W as particle, and the surface scrubber SS removes such particle.
[0075] Substrate W is again returned to Indexer IDA by the carrier robot TR from the washing processing section 110 after surface washing. That is, the substrate [finishing / processing] W is passed to the transfer robot TF of Indexer IDA from a carrier robot TR, and the transfer robot TF contains the substrate W on Carrier C. The carrier C with which two or more substrates [finishing / processing] W were contained soon will be taken out from the indexer ID of

substrate processor 1a.
[0076] In addition, the above is an example of the processing in substrate processor 1a, for example, after it performs surface washing previously, it may be made to perform rear-face washing.
[0077] as mentioned above -- this operation gestalt -- the washing processing section 110 and ashing -- the processing section 120 is unified and included in one substrate processor 1a. That is, substrate processor 1a unifies the washing station and plasma asher which were a separate isolated system conventionally. Even if it unifies a mechanical hardware configuration, it is as having mentioned already for it to be difficult, unification of software, i.e., reconstruction of the integrated control software. for this reason -- the 2nd operation gestalt -- the 1st operation gestalt -- the same -- the washing processing section 110 and ashing -- the processing section 120 -- respectively -- ** -- separate [to mutual] in the host communication link line 80 -- independent -- connecting -- the washing processing section 110 and ashing -- the processing section 120 -- respectively -- ** -- data communication is made to perform according to an individual between host computers 80
[0078] That is, as shown in drawing 5 , the host communication link line 80 and the control section 131 of the washing processing section 110 of substrate processor 1a are connected with the washing station communication link line 165 (the 1st communication link line). When making substrate processor 1a perform substrate processing in the substrate processing system of the 2nd operation gestalt, according to the flow recipe applied about a certain lot, a host computer 90 transmits a command to the control section 131 of the washing processing section 110 in order via the host communication link line 80 and the washing station communication link line 165. Procedure and processing conditions of Substrate W which were mentioned above are described to be "flow recipes."
[0079] A control section 131 controls Indexer IDA, a carrier robot TR, and the pars inflexa 150 in each device (for example, motor 113 of rear-face scrubber SSR) list which constitutes the washing processing section 110 according to the command transmitted from the host computer 90, and makes a series of washing processings perform to Substrate W. moreover, the inside of the processing section by which a control section 131 is contained in substrate processor 1a -- ashing -- the actual washing time amount in the equipment information SSR, for example, the rear-face scrubber, of the processing section other than processing section 120, the rotational frequency of Substrate W, etc. are acquired. The acquired equipment information is transmitted to a host computer 90 in order from a control section 131 via the washing station communication link line 165 and the host communication link line 80.
[0080] That is, the washing station communication link line 165 is a circuit in which connect the washing processing section 110 and the host communication link line 80 to, and data communication is made to perform between the washing processing section 110 and a host computer 90.
[0081] on the other hand -- ashing of the host communication link line 80 and substrate processor 1a -- the control section 132 of the processing section 120 -- ashing -- it connects with the processor communication link line 170 (the 2nd communication link line). ashing -- it is prepared separately [the processor communication link line 170 and the washing station communication link line 165] independently. a host computer 90 -- the host communication link line 80 and ashing -- the command which was made to go via the processor communication link line 170 in order, and followed the flow recipe, and ashing -- a parameter required for processing etc. -- ashing -- it transmits to the processing section 120.
[0082] moreover, the inside of the processing section by which a host computer 90 is contained in substrate processor 1a -- ashing -- the processing sections other than processing section 120, and ashing -- synchronizing with the processing section 120 is performed. for example, the carrier robot TR -- Substrate W -- ashing -- the time of carrying in to the ashing unit ASH of the processing section 120 -- a host computer 90 -- ashing -- initiation of ashing is directed to the control section 132 of the processing section 120. on the contrary, ashing -- when predetermined processing in the processing section 120 is completed, a host computer 90 directs initiation of washing processing to the control section 131 of the washing processing

section 110. A control section 131,132 performs motion control (control of Indexer ID, the washing processing section 110, a carrier robot TR, and the pars inflexa 150) for motion control with original each, i.e., washing processing, and motion control for ashing (ashing control of the processing section 120) according to synchronizing of a host computer 90.
[0083] moreover, the control section 132 — ashing — the equipment information on the processing section 120, for example, the degree of vacuum and applied voltage of the processing interior of a room, is acquired. the acquired equipment information — ashing from a control section 132 — it is transmitted to a host computer 90 in order via the processor communication link line 170 and the host communication link line 80. The host computer 90 is stored in the magnetic-disk 94 grade by using as a database equipment information about substrate processor 1a transmitted from the control section 131,132.
[0084] namely, ashing — the processor communication link line 170 — ashing — the processing section 120 and the host communication link line 80 — connecting — ashing — it is the circuit in which data communication is made to perform between the processing section 120 and a host computer 90. and ashing — it prepares separately [the processor communication link line 170 and the washing station communication link line 165] independently — having — a host computer 90, the washing processing section 110, and ashing — as for the processing section 120, data communication is performed according to an individual.
[0085] thus — if it carries out — ashing — the ** for which the data communication of the processing section 120 and a host computer 90 does not use the washing station communication link line 165 — ashing — since the processor communication link line 170 can perform, the load of the washing station communication link line 165 is mitigable.
[0086] moreover, a host computer 90, the washing processing section 110, and ashing — the processing section 120 — an individual exception — connecting — a host computer 90 — ashing — if synchronizing of the processing section 120 and the other processing section is made to perform, without it will reconstruct the integrated control software — a simple configuration — the washing processing section 110 and ashing — substrate processor 1a equipped with the processing section 120 can be employed.
[0087] moreover, ashing which performs ashing which is the direct head end process of washing processing — it is conveying, holding Substrate W by sheet-like voice with the carrier robot TR common in order of the washing processing section 110 which performs washing processing from the processing section 120. For this reason, the dead time which conveyance between equipment takes can be abolished.
[0088] Moreover, since washing processing of Substrate W will be comparatively performed after ashing for a short time, the particle which remained after ashing cannot adhere to a substrate firmly, but can raise the washing processing engine performance.
[0089] As mentioned above, although the gestalt of operation of the 2nd of this invention was explained, this invention is not limited to the above-mentioned example. for example, the 2nd operation gestalt — the washing station communication link line 165 and ashing — although he was trying to connect the processor communication link line 170 to the host communication link line 80, respectively, it may be made to carry out direct continuation of these to a host computer 90, respectively. Drawing 8 is the block diagram showing other examples of the substrate processing system of the 2nd operation gestalt.
[0090] He is trying to establish two or more communication link ports in the communications department 95 of a host computer 90 about one substrate processor 1a in the system of drawing 8 . for this reason — while carrying out direct continuation of the communications department 95 of a host computer 90, and the control section 131 of the washing processing section 110 of substrate processor 1a with the washing station communication link line 165 — the communications department 95 and ashing — the control section 132 of the processing section 120 — ashing — direct continuation is carried out with the processor communication link line 170. namely, the 2nd operation gestalt — the same — ashing — it prepares separately [the processor communication link line 170 and the washing station communication link line 165] independently — having — a host computer 90, the washing processing section 110, and ashing — as for the processing section 120, data communication is performed according to an

individual. In addition, if the point that the topologies of a host computer 90 and substrate processor 1a differ is removed, a system configuration and the content of processing are the same as the above-mentioned 2nd operation gestalt.
[0091] thus — even if it carries out -- ashing — the ** for which the data communication of the processing section 120 and a host computer 90 does not use the washing station communication link line 165 -- ashing — since the processor communication link line 170 can perform, the load of the washing station communication link line 165 is mitigable.
[0092] moreover, a host computer 90, the washing processing section 110, and ashing — the processing section 120 — an individual exception -- connecting — a host computer 90 — ashing — if synchronizing of the processing section 120 and the other processing section is made to perform, without it will reconstruct the integrated control software — a simple configuration -- the washing processing section 110 and ashing — substrate processor 1a equipped with the processing section 120 can be employed.
[0093] moreover, the 2nd operation gestalt -- setting -- the washing processing section 110 and ashing -- although he was trying to include the processing section 120 in one substrate processor 1a, washing processing is performed two or more times in the production process of a semi-conductor etc., and you may make it incorporate the washing processing section 110 and other processing sections in one equipment For example, it unites with the membrane formation processing section which forms an oxide film, the etching processing section which performs etching of a substrate, and the washing processing section, and you may make it incorporate in the equipment of 1. That is, if the washing processing section which performs washing processing of a substrate, and the pretreatment section which perform processing applicable to the direct head end process of washing processing unify, it incorporates in the equipment of 1 and those each and host computers 90 connect with a separate independent communication link line, respectively, the substrate processor had two or more processing sections processing which is different with a simple configuration carries [sections] out like the 2nd operation gestalt can apply.
[0094] Moreover, two or more processing sections which perform not the thing limited to unifying the washing processing section and the processing section which performs the direct head end process of washing processing, and including in substrate processor 1a but different processing to which each does not follow a substrate are unified, and you may make it include in substrate processor 1a.
[0095] Furthermore, although the washing processing section 110 was used as the spin scrubber which performs mechanical washing with a washing brush in the 2nd operation gestalt Not the thing limited to this but the unit which washes by spraying the pure water which gave the supersonic wave on a substrate, You may make it the unit which washes by spraying high-pressure pure water on a substrate, the unit which washes by mixing a gaseous phase to the liquid phase and spraying a substrate constitute the washing processing section.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the outline of the whole substrate processor concerning this invention.
[Drawing 2] It is the top view showing the outline configuration of the substrate processor of drawing 1 .
[Drawing 3] It is the block diagram showing an example of the substrate processing system concerning this invention.
[Drawing 4] It is the block diagram showing other examples of the substrate processing system concerning this invention.
[Drawing 5] It is the block diagram showing the substrate processing system of the 2nd operation gestalt.
[Drawing 6] It is the top view showing the configuration of the substrate processor of the 2nd operation gestalt.
[Drawing 7] It is the sectional view seen along with the V-V line of drawing 6 .
[Drawing 8] It is the block diagram showing other examples of the substrate processing system of the 2nd operation gestalt.
[Description of Notations]
1 1a Substrate processor
10 20 Inspection unit
70 Inspection Unit Permanent Communication Line
75 Communication Link Line in Equipment
80 Host Communication Link Line
90 Host Computer
110 Washing Processing Section
120 Ashing -- Processing Section
165 Washing Station Communication Link Line
170 Ashing -- Processor Communication Link Line
ASH Ashing unit
C Carrier
ID, IDA Indexer
SS Surface scrubber
SC Spreading processing unit
SD Development unit
SSR Rear-face scrubber
TR Carrier robot
W Substrate

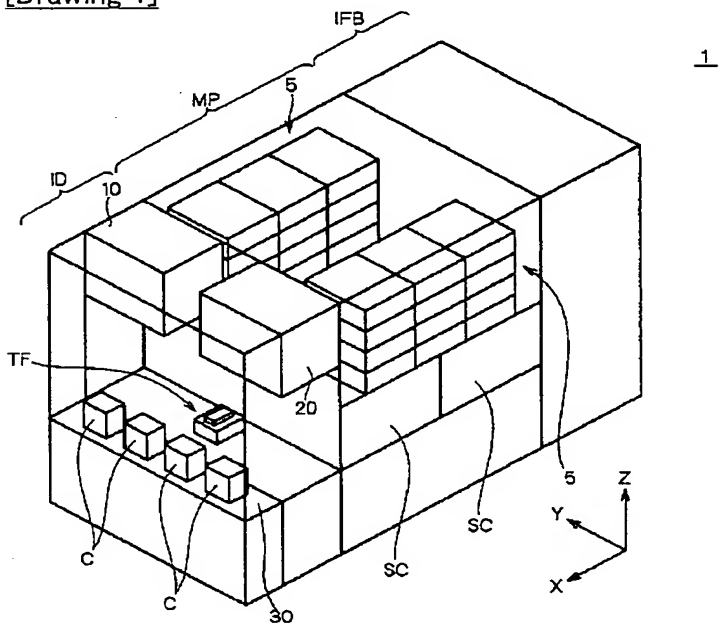
[Translation done.]

* NOTICES *

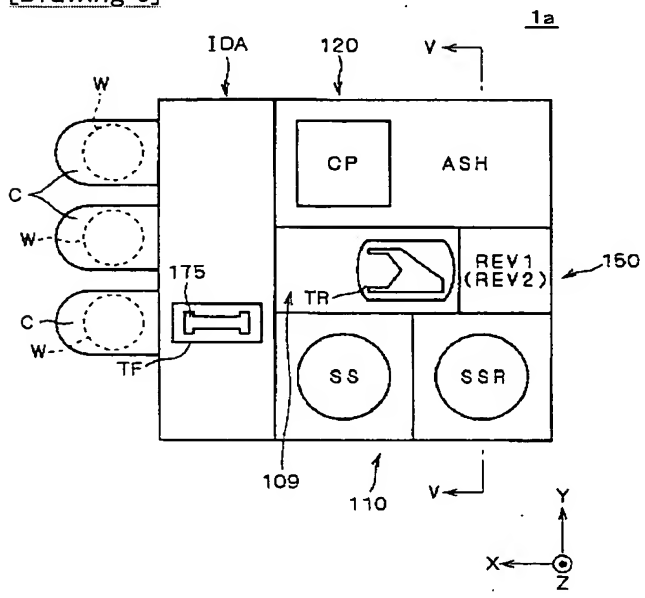
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

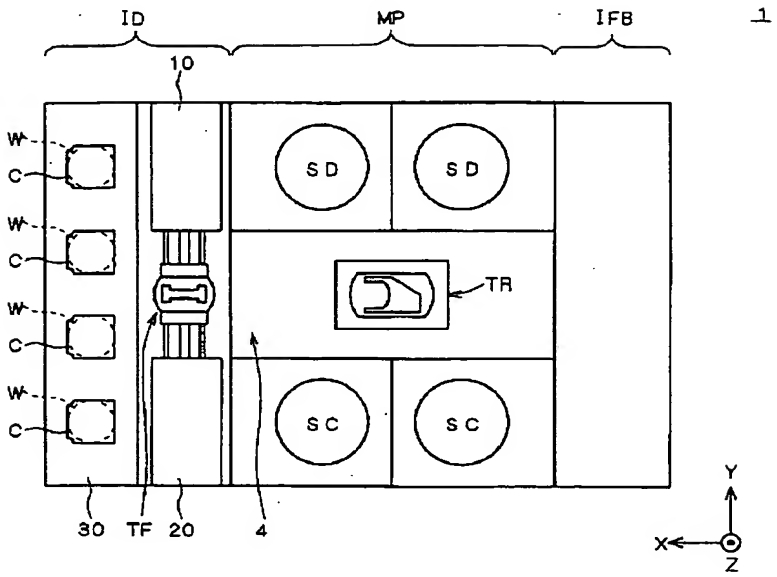
[Drawing 1]



[Drawing 6]



[Drawing 2]



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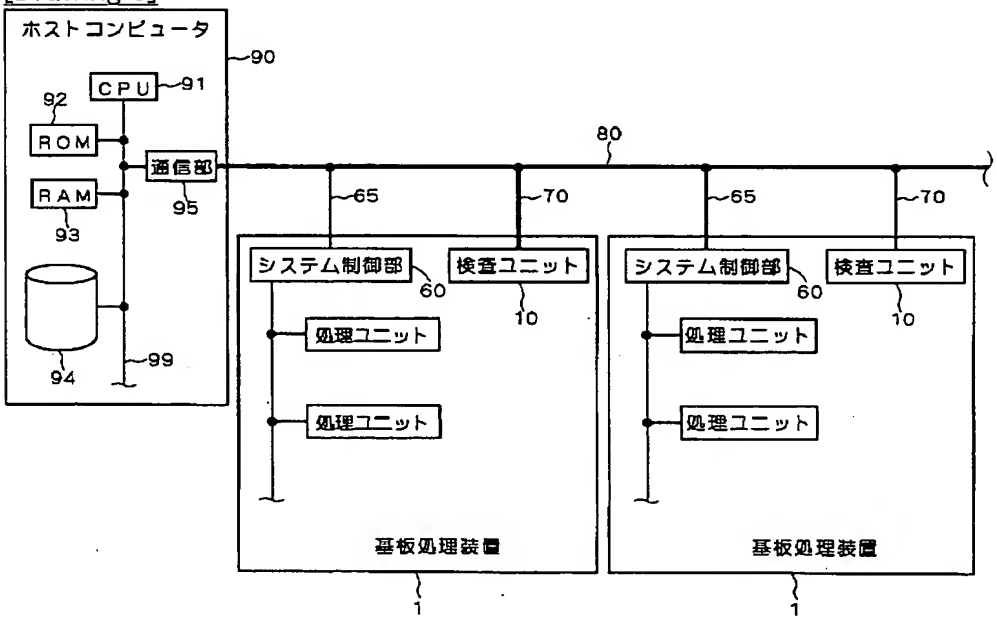
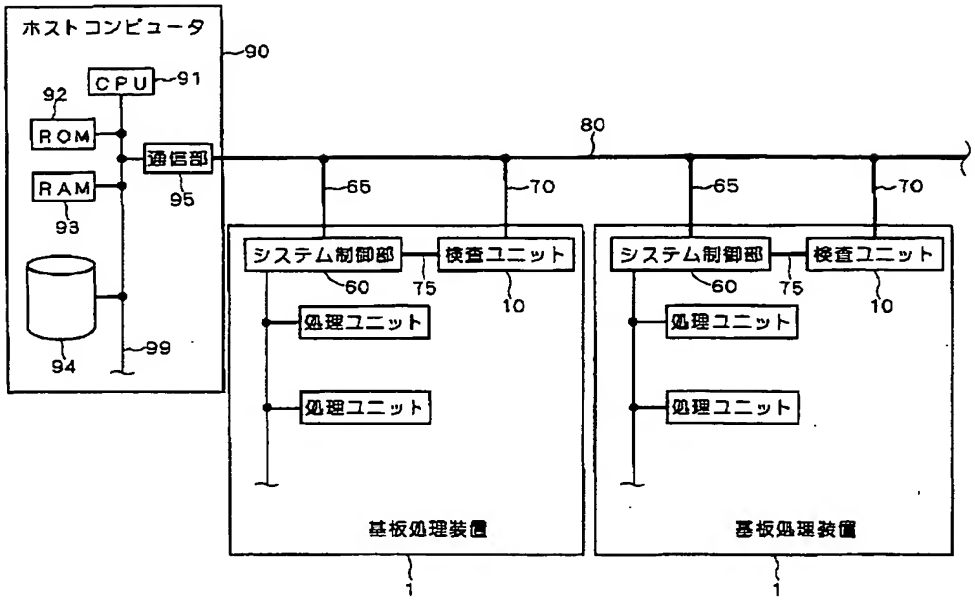
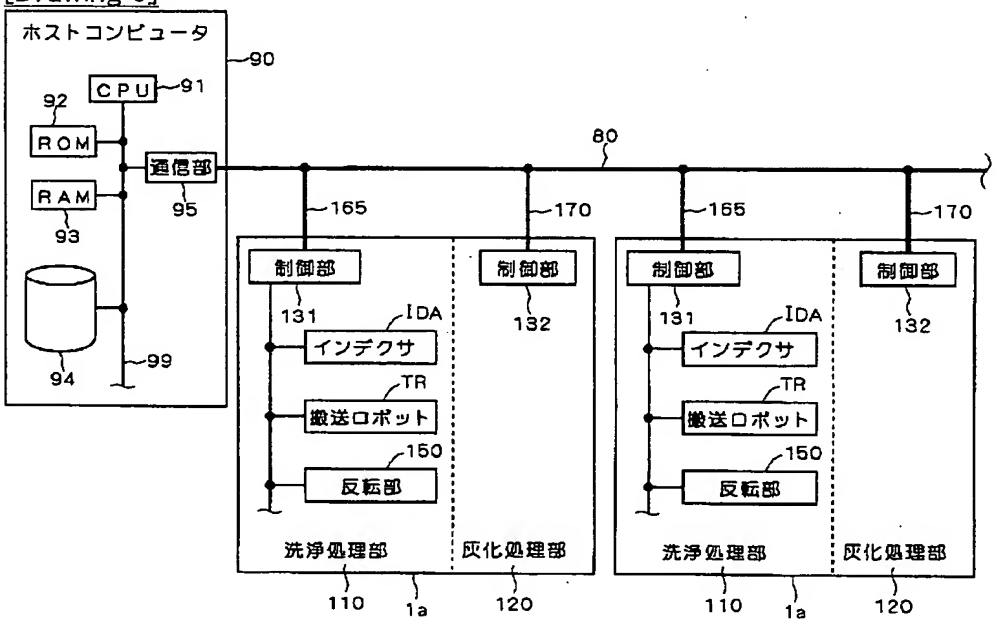


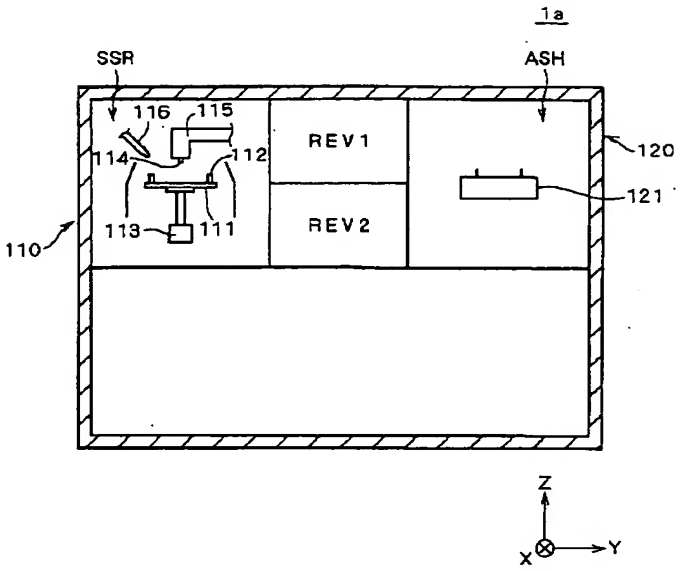
[Drawing 4]



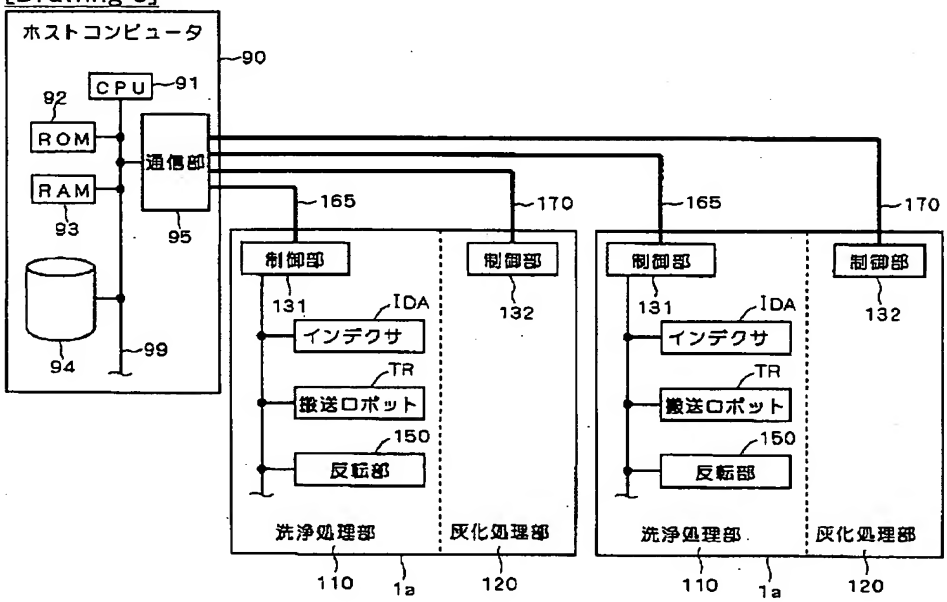
[Drawing 5]



[Drawing 7]



[Drawing 8]



[Translation done.]

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			５０２Ｇ	

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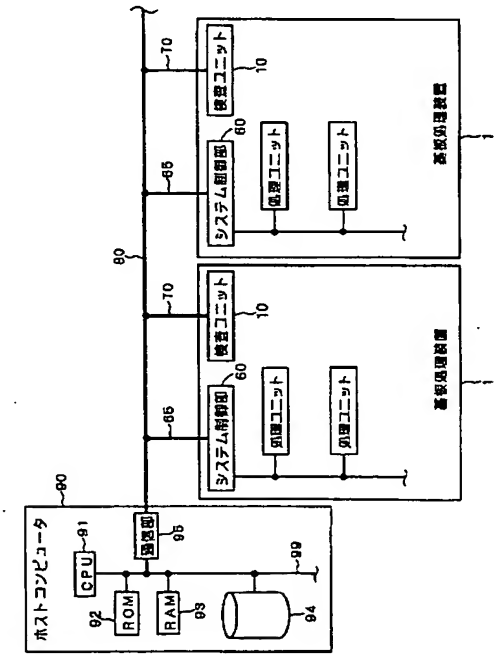
最終頁に続く

(54)【発明の名称】　基板処理装置および基板処理システム

(57)【要約】
【課題】　基板処理装置と外部との間の通信ライン負荷を軽減することができる基板処理技術を提供する。
【解決手段】　処理装置通信ライン６５は基板処理装置１の処理ユニットとホスト通信ライン８０とを接続し、処理ユニットとホストコンピュータ９０との間でデータ通信を行わせる回線である。一方、検査ユニット専用通信ライン７０は検査ユニット１０とホスト通信ライン８０とを接続し、検査ユニット１０とホストコンピュータ９０との間でデータ通信を行わせる回線である。そして、検査ユニット専用通信ライン７０と処理装置通信ライン６５とは別個独立に設けられている。従って、検査ユニット１０にて得られた検査データは検査ユニット専用通信ライン７０によって直接ホストコンピュータ９０に送信することができるため、処理装置通信ライン６５の負荷を軽減することができる。



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【特許請求の範囲】

【請求項１】　基板に所定の処理を行う処理部を備えた基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムであって、

前記基板処理装置は、基板に対して所定の検査を行う検査部を備え、

前記検査部と前記ホスト通信ラインとを接続し、前記検査部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、

前記第１通信ラインとは別個独立に前記処理部と前記ホスト通信ラインとを接続し、前記処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えることを特徴とする基板処理システム。

【請求項２】　請求項１記載の基板処理システムにおいて、

前記処理部と前記検査部との間でデータ通信を行うための装置内通信ラインを前記基板処理装置内に設けることを特徴とする基板処理システム。

【請求項３】　基板に所定の処理を行う処理部を備えた基板処理装置であって、

基板に対して所定の検査を行う検査部と、

前記検査部と装置外部との間でデータ通信を行うための第１通信ラインと、

前記第１通信ラインとは別個独立に設けられ、前記処理部と装置外部との間でデータ通信を行うための第２通信ラインと、を備えることを特徴とする基板処理装置。

【請求項４】　請求項３記載の基板処理装置において、

前記処理部と前記検査部との間でデータ通信を行うための装置内通信ラインをさらに備えることを特徴とする基板処理装置。

【請求項５】　それぞれが基板に異なる処理を行う複数の処理部を備えた基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムであって、

前記複数の処理部のそれぞれと前記ホスト通信ラインとを相互に別個独立に接続し、前記複数の処理部のそれぞれと前記ホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えることを特徴とする基板処理システム。

【請求項６】　基板に洗浄処理を行う洗浄部と、前記洗浄処理の直前処理工程としての灰化処理を行う灰化処理部とを備えた基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムであって、

前記洗浄部と前記ホスト通信ラインとを接続し、前記洗浄部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、

前記第１通信ラインとは別個独立に前記灰化処理部と前記ホスト通信ラインとを接続し、前記灰化処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えることを特徴とする基板処理システム。

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【請求項７】　それぞれが基板に異なる処理を行う複数の処理部を備えた基板処理装置とホストコンピュータとを接続した基板処理システムであって、

前記複数の処理部のそれぞれと前記ホストコンピュータとを相互に別個独立に接続し、前記複数の処理部のそれぞれと前記ホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えることを特徴とする基板処理システム。

【請求項８】　基板に洗浄処理を行う洗浄部と、前記洗浄処理の直前処理工程としての灰化処理を行う灰化処理部とを備えた基板処理装置とホストコンピュータとを接続した基板処理システムであって、

前記洗浄部と前記ホストコンピュータとを接続し、前記洗浄部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、

前記第１通信ラインとは別個独立に前記灰化処理部と前記ホストコンピュータとを接続し、前記灰化処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えることを特徴とする基板処理システム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、半導体基板、液晶表示装置用ガラス基板、フォトマスク用ガラス基板、光ディスク用基板等（以下、単に「基板」と称する）に対して所定の検査、例えばレジストの膜厚測定等を行う検査部を組み込んだ基板処理装置およびその基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムに関する。

【０００２】

【従来の技術】周知のように、半導体や液晶ディスプレイなどの製品は、上記基板に対して洗浄、レジスト塗布、露光、現像、エッチング、層間絶縁膜の形成、熱処理、ダイシングなどの一連の諸処理を施すことにより製造されている。かかる半導体製品等の品質維持のため、上記各種処理のまとまったプロセスの後に、基板の各種検査を行って品質確認を行うことが重要である。

【０００３】例えば、レジスト塗布処理および現像処理を行う基板処理装置（いわゆるコータ＆デベロッパ）においては、従来より現像処理の最終工程にて基板上のパターンの線幅測定等の検査を行うようにしていた。このときに、検査対象となる基板は一旦基板処理装置から搬出され、別位置に設けられた専用の検査装置に搬入されてから検査に供されることとなる。そして、その検査結果が基板処理装置にフィードバックされ、各種処理条件の調整が行われるのである。

【０００４】

【背景となる技術】ところが、従来においては、基板処

理装置と検査装置とが別に設けられていたために、検査対象となる基板を検査装置まで運搬しなければならず、時間および労力の無駄が生じていた。また、検査装置への搬入時間が必要であるとともに検査結果が判明するまでにもある程度の時間を要していたため、ある基板についての検査結果が判明するまでに、当該基板よりも後に装置に払い出された基板の相当数の処理が終了していた。このため、検査結果に不具合があった場合には、相当数の基板について再処理を行う必要が生じ、処理効率が低下することとなっていた。

【０００５】このような問題を解決するために、基板処理装置の内部に検査装置を組み込むことが検討されている。基板処理装置の内部に検査装置を組み込めば、基板処理装置の搬送ロボットによって検査装置に基板を搬送することができるため、無駄な搬送時間を省略することができ、短時間のうちに検査結果を判明させることができる。従って、検査結果に不具合があったとしても、再処理が必要な基板枚数を少なくすることができる。

【０００６】一方、半導体等を製造する工場においては、基板処理装置を単独で使用することはまれであり、複数の基板処理装置を通信ラインを介してホストコンピュータに接続して使用する場合が多い。ホストコンピュータは、各基板処理装置に処理手順を記述したフローレシピを送信するとともに、検査装置から送られてくる検査データを受信して、その解析および判定を行う。

【０００７】

【発明が解決しようとする課題】しかしながら、一般に検査装置が送信する検査データの量は膨大であり、基板処理装置とホストコンピュータとの間の通信ラインに多大な負担を強いることとなっていた。また、ホストコンピュータと基板処理装置との間で通信トラブルが発生した場合、検査装置自体は検査を行える状態にあったとしても検査データをホストコンピュータに送信することは出来なかった。

【０００８】また、検査装置以外においても装置間搬送のための無駄な時間を無くすべく、レジストと酸素プラズマとを化学反応させるアッシング（灰化処理）によってレジスト除去を行うプラズマアッシャをアッシング後の洗浄処理を行う洗浄装置に組み込んで一体化した装置も検討されている。しかし、このように異なる処理を行う２種類以上の装置を一体化した場合、装置を制御するためのソフトウェアの再構築が必要となる。すなわち、従来においては、洗浄装置は洗浄処理のための専用の制御ソフトウェアによって運用されている一方でプラズマアッシャはアッシングのための専用の制御ソフトウェアによって運用されていたのであるが、例えば洗浄装置にプラズマアッシャを搭載する場合には、洗浄装置側にプラズマアッシャのソフト情報を開示して一体化した装置全体を運用するための統合制御ソフトウェアを再構築する必要があった。

【０００９】ところが、既に実績のある洗浄処理用およびアッシングのための専用の制御ソフトウェアを廃止して新たな統合制御ソフトウェアの再構築には多大な労力と時間を要するという問題がある。

【００１０】本発明は、上記課題に鑑みてなされたものであり、基板処理装置と外部との間の通信ライン負荷を軽減することができる基板処理技術を提供することを第１の目的とする。

【００１１】また、簡易な構成にて異なる処理を行う複数の処理部を備えた基板処理装置を運用することができる基板処理技術を提供することを第２の目的とする。

【００１２】

【課題を解決するための手段】上記課題を解決するため、請求項１の発明は、基板に所定の処理を行う処理部を備えた基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムにおいて、前記基板処理装置に、基板に対して所定の検査を行う検査部を備え、前記検査部と前記ホスト通信ラインとを接続し、前記検査部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、前記第１通信ラインとは別個独立に前記処理部と前記ホスト通信ラインとを接続し、前記処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えている。

【００１３】また、請求項２の発明は、請求項１の発明に係る基板処理システムにおいて、前記処理部と前記検査部との間でデータ通信を行うための装置内通信ラインを前記基板処理装置内に設けている。

【００１４】また、請求項３の発明は、基板に所定の処理を行う処理部を備えた基板処理装置において、基板に対して所定の検査を行う検査部と、前記検査部と装置外部との間でデータ通信を行うための第１通信ラインと、前記第１通信ラインとは別個独立に設けられ、前記処理部と装置外部との間でデータ通信を行うための第２通信ラインと、を備えている。

【００１５】また、請求項４の発明は、請求項３の発明に係る基板処理装置において、前記処理部と前記検査部との間でデータ通信を行うための装置内通信ラインをさらに備えている。

【００１６】また、請求項５の発明は、それぞれが基板に異なる処理を行う複数の処理部を備えた基板処理装置とホストコンピュータとをホスト通信ラインにて接続した基板処理システムにおいて、前記複数の処理部のそれぞれと前記ホスト通信ラインとを相互に別個独立に接続し、前記複数の処理部のそれぞれと前記ホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えている。

【００１７】また、請求項６の発明は、基板に洗浄処理を行う洗浄部と、前記洗浄処理の直前処理工程としての灰化処理を行う灰化処理部とを備えた基板処理装置とホ

ストコンピュータとをホスト通信ラインにて接続した基板処理システムにおいて、前記洗浄部と前記ホスト通信ラインとを接続し、前記洗浄部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、前記第１通信ラインとは別個独立に前記灰化処理部と前記ホスト通信ラインとを接続し、前記灰化処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えている。

【００１８】また、請求項７の発明は、それぞれが基板に異なる処理を行う複数の処理部を備えた基板処理装置とホストコンピュータとを接続した基板処理システムにおいて、前記複数の処理部のそれぞれと前記ホストコンピュータとを相互に別個独立に接続し、前記複数の処理部のそれぞれと前記ホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えている。

【００１９】また、請求項８の発明は、基板に洗浄処理を行う洗浄部と、前記洗浄処理の直前処理工程としての灰化処理を行う灰化処理部とを備えた基板処理装置とホストコンピュータとを接続した基板処理システムにおいて、前記洗浄部と前記ホストコンピュータとを接続し、前記洗浄部と前記ホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、前記第１通信ラインとは別個独立に前記灰化処理部と前記ホストコンピュータとを接続し、前記灰化処理部と前記ホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えている。

【００２０】

【発明の実施の形態】以下、図面を参照しつつ本発明の実施の形態について詳細に説明する。

【００２１】＜１．第１実施形態＞図１は、本発明に係る基板処理装置全体の概略を示す斜視図である。また、図２は、この基板処理装置１の概略構成を示す平面図である。なお、図１および図２にはそれらの方向関係を明確にするためにＺ軸方向を鉛直方向とし、ＸＹ平面を水平面とするＸＹＺ直交座標系を付している。この基板処理装置１は、基板Ｗにレジスト塗布処理および現像処理を行う基板処理装置（いわゆるコータ＆デベロッパ）であり、大別してインデクサＩＤとユニット配置部ＭＰとインターフェイスＩＦＢとにより構成されている。

【００２２】インデクサＩＤは、移載ロボットＴＦ、検査ユニット１０，２０（検査部）および載置ステージ３０を備えている。載置ステージ３０には、４つのキャリアＣを水平方向（Ｙ軸方向）に沿って配列して載置することができる。それぞれのキャリアＣには、多段の収納溝が刻設されており、それぞれの溝には１枚の基板Ｗを水平姿勢にて（主面を水平面に沿わせて）収容することができる。従って、各キャリアＣには、複数の基板Ｗ（例えば２５枚）を水平姿勢かつ多段に所定の間隔を隔てて積層した状態にて収納することができる。なお、キャリアＣの形態としては、基板Ｗを密閉空間に収納するＦＯＵＰ(front opening unified pod)または、収納基板Ｗを外気に曝すＯＣ(open casette)のいずれであっても良い。

【００２３】移載ロボットＴＦは、１本の移載アームを備えており、その移載アームを高さ方向に昇降動作させること、回転動作させることおよび水平方向に進退移動させることができる。また、移載ロボットＴＦ自身がＹ方向に沿って移動することにより、移載アームをＹ軸方向に沿って水平移動させることができる。つまり、移載ロボットＴＦは、移載アームを３次元的に移動させることができるのである。

【００２４】このような移載ロボットＴＦの動作により、インデクサＩＤは、複数の基板Ｗを収納可能なキャリアＣから未処理の基板Ｗを取り出してユニット配置部ＭＰに渡すとともに、ユニット配置部ＭＰから処理済の基板Ｗを受け取ってキャリアＣに収納することができる。また、インデクサＩＤは、移載ロボットＴＦによって検査ユニット１０および検査ユニット２０に対する基板Ｗの搬出入をも行う。

【００２５】検査ユニット１０はマクロ欠陥検査を行う検査ユニット（マクロ欠陥検査ユニット）である。「マクロ欠陥検査」は、基板Ｗ上に現出した比較的大きな欠陥、例えばパーティクルの付着の有無を判定する検査である。一方、検査ユニット２０は、レジストの膜厚測定、パターンの線幅測定およびパターンの重ね合わせ測定を行う検査ユニットである。すなわち、検査ユニット２０は、１つの検査ユニットで３種類の検査を行うことができるのである。「レジストの膜厚測定」は、基板Ｗ上に塗布されたレジストの膜厚を測定する検査である。「パターンの線幅測定」は、露光および現像処理によって基板Ｗ上に形成されたパターンの線幅を測定する検査である。「パターンの重ね合わせ測定」は、露光および現像処理によって基板Ｗ上に形成されたパターンのずれを測定する検査である。

【００２６】検査ユニット１０および検査ユニット２０はいずれもインデクサＩＤの内部の上側の両隅に配置されている。より正確には、上方から見たときに（（－Ｚ）向きに見たときに）、インデクサＩＤの中に検査ユニット１０および検査ユニット２０が完全に包含される関係となる。

【００２７】ユニット配置部ＭＰには、基板Ｗに所定の処理を行う処理ユニットが複数配置されている。すなわち、ユニット配置部ＭＰの前面側（－Ｙ側）には２つの塗布処理ユニットＳＣが配置されている。塗布処理ユニットＳＣは、基板Ｗを回転させつつその基板主面にフォトレジストを滴下することによって均一なレジスト塗布を行う、いわゆるスピンコータである。

【００２８】また、ユニット配置部ＭＰの背面側（＋Ｙ側）であって、塗布処理ユニットＳＣと同じ高さ位置には２つの現像処理ユニットＳＤが配置されている。現像

処理ユニットＳＤは、露光後の基板Ｗ上に現像液を供給することによって現像処理を行う、いわゆるスピンデベロッパである。塗布処理ユニットＳＣと現像処理ユニットＳＤとは搬送路４を挟んで対向配置されている。

【００２９】２つの塗布処理ユニットＳＣおよび２つの現像処理ユニットＳＤのそれぞれの上方には、図示を省略するファンフィルタユニットを挟んで熱処理ユニット群５が配置されている（図示の便宜上、図２では熱処理ユニット群５を省略）。熱処理ユニット群５には、基板Ｗを加熱して所定の温度にまで昇温するいわゆるホットプレートおよび基板Ｗを冷却して所定の温度にまで降温するとともに該基板Ｗを当該所定の温度に維持するいわゆるクールプレートが組み込まれている。なお、ホットプレートには、レジスト塗布処理前の基板に密着強化処理を行う密着強化ユニットや露光後の基板のベーク処理を行う露光後ベークユニットが含まれる。本明細書では、ホットプレートおよびクールプレートを総称して熱処理ユニットとし、塗布処理ユニットＳＣ、現像処理ユニットＳＤおよび熱処理ユニットを総称して処理ユニット（処理部）とする。

【００３０】塗布処理ユニットＳＣと現像処理ユニットＳＤとの間に挟まれた搬送路４には搬送ロボットＴＲが配置されている。搬送ロボットＴＲは、２つの搬送アームを備えており、その搬送アームを鉛直方向に沿って昇降させることと、水平面内で回転させることと、水平面内にて進退移動を行わせることができる。これにより、搬送ロボットＴＲはユニット配置部ＭＰに配置された各処理ユニットの間で基板Ｗを所定の処理手順にしたがって循環搬送することができる。また、搬送ロボットＴＲは、インデクサＩＤの移載ロボットＴＦおよびインターフェイスＩＦＢとの間でも基板Ｗの受け渡しを行うことができる。

【００３１】インターフェイスＩＦＢは、レジスト塗布処理済の基板Ｗをユニット配置部ＭＰから受け取って図外の露光装置（ステッパ）に渡すとともに、露光後の基板Ｗを該露光装置から受け取ってユニット配置部ＭＰに戻す機能を有する。この機能を実現するためにインターフェイスＩＦＢには基板Ｗの受け渡しを行うための受け渡しロボット（図示省略）が配置されている。また、インターフェイスＩＦＢにはユニット配置部ＭＰでの処理時間と露光装置での処理時間との差を解消するために基板Ｗを一時収納するバッファ部も設けられている。

【００３２】次に、上記の構成を有する基板処理装置１における処理について説明する。まず、インデクサＩＤの移載ロボットＴＦが未処理の基板Ｗをキャリア Ｃから取り出して、ユニット配置部ＭＰの搬送ロボットＴＲに渡す。未処理の基板Ｗを取り出すときには、該基板Ｗを収納したキャリアＣの正面に移載ロボットＴＦが移動し、移載アームを基板Ｗの下方に差し入れる。そして、移載ロボットＴＦは、移載アームを若干上昇させて基板Ｗを保持し、移載アームを退出させることによって未処理の基板Ｗを取り出す。

【００３３】ユニット配置部ＭＰに渡された基板Ｗは、所定の処理手順に従って搬送ロボットＴＲにより各処理ユニット間で循環搬送される。具体的には、密着強化処理を行った基板Ｗにレジスト塗布処理を行い、その後プリベーク処理を行ってレジスト膜を形成した基板ＷをインターフェイスＩＦＢを介して露光装置に渡す。露光処理が終了した基板Ｗは露光装置からインターフェイスＩＦＢを介して再びユニット配置部ＭＰに戻される。露光後の基板Ｗに対しては露光後ベーク処理を行った後、現像処理を行う。現像処理が終了した基板Ｗは、さらにベーク処理が行われた後、ユニット配置部ＭＰの搬送ロボットからインデクサＩＤの移載ロボットＴＦに渡される。処理済の基板Ｗを受け取った移載ロボットＴＦは、その基板Ｗをキャリア Ｃに収納する。

【００３４】以上は、基板Ｗに行われる基本的な処理を簡潔に述べたものであるが、本実施形態の基板処理装置１では、基板の検査も装置内にて行われる。各種検査のうちレジストの膜厚測定はプリベーク後の露光装置に搬入する前の基板Ｗに対して行うのが好ましい。この場合、プリベーク処理が終了した基板Ｗを一旦ユニット配置部ＭＰからインデクサＩＤに戻し、移載ロボットＴＦが該基板Ｗを検査ユニット２０に搬入する。レジストの膜厚測定が終了した基板Ｗは移載ロボットＴＦによって検査ユニット２０から再びユニット配置部ＭＰに渡され、ユニット配置部ＭＰの搬送ロボットＴＲからインターフェイスＩＦＢに渡され、露光装置に搬入されることとなる。

【００３５】また、マクロ欠陥検査、パターンの線幅測定およびパターンの重ね合わせ測定については、全ての処理が終了してインデクサＩＤに戻ってきた基板Ｗに対して行うのが好ましい。マクロ欠陥検査については、全ての処理が終了してインデクサＩＤに戻ってきた基板Ｗを移載ロボットＴＦが検査ユニット１０に搬入して行うようにする。一方、パターンの線幅測定およびパターンの重ね合わせ測定については、全ての処理が終了してインデクサＩＤに戻ってきた基板Ｗを移載ロボットＴＦが検査ユニット２０に搬入して行うようにする。いずれの場合も、検査が終了した基板Ｗは検査ユニット１０または検査ユニット２０から移載ロボットＴＦによってキャリアＣに収納される。

【００３６】以上のような基板検査をも含めた一連の処理は処理手順を記述したフローレシピに従って実現されるものである。本実施形態では、クリーンルーム等に配置される複数の基板処理装置１が１台のホストコンピュータに接続されており、フローレシピは該ホストコンピュータから各基板処理装置１に送信される。

【００３７】図３は、基板処理装置１とホストコンピュータとを接続した本発明に係る基板処理システムの概略

構成を示すブロック図である。各基板処理装置１は、図１および図２に示したのと同じものである。基板処理装置１に設けられた処理ユニットは塗布処理ユニットＳＣ、現像処理ユニットＳＤおよび熱処理ユニットの総称であって、図３に記載する処理ユニットもそれらのうちのいずれかである。これら処理ユニット、搬送ロボットＴＲおよび移載ロボットＴＦはいずれもシステム制御部６０によって直接または間接に制御されている。システム制御部６０は、基板処理装置１に内蔵されたコンピュータによって構成されており、演算処理を行うためのＣＰＵ、メモリ、磁気ディスク等を備えている。

【００３８】ホストコンピュータ９０は、その本体部であって演算処理を行うＣＰＵ９１と、読み出し専用メモリーであるＲＯＭ９２と、読み書き自在のメモリーであるＲＡＭ９３と、制御用ソフトウェアやデータなどを記憶しておく磁気ディスク９４と、基板処理装置１などとの間で通信を行う通信部９５とを備えている。ＣＰＵ９１と磁気ディスク９４や通信部９５等とはバスライン９９を介して電気的に接続されている。そして、通信部９５にはホスト通信ライン８０が接続されている。

【００３９】図３に示すように、ホスト通信ライン８０と基板処理装置１のシステム制御部６０とは処理装置通信ライン６５（第２通信ライン）にて接続されている。上述したフローレシピは、ホストコンピュータ９０からホスト通信ライン８０および処理装置通信ライン６５を順に経由してシステム制御部６０に送信される。システム制御部６０は、送信されてきたフローレシピに従って各処理ユニットおよび搬送ロボットＴＲ等を制御し、上述したような一連の処理を基板Ｗに対して行わせる。また、各処理ユニットにおける処理状況等を示す処理データが各処理ユニットからシステム制御部６０を介して、処理装置通信ライン６５およびホスト通信ライン８０を順に経由してホストコンピュータ９０に送信される。

【００４０】すなわち、処理装置通信ライン６５は処理ユニットとホスト通信ライン８０とを接続し、処理ユニットとホストコンピュータ９０との間でデータ通信を行わせる回線である。

【００４１】一方、ホスト通信ライン８０と基板処理装置１の検査ユニット１０とは検査ユニット専用通信ライン７０（第１通信ライン）にて接続されている。検査ユニット専用通信ライン７０と処理装置通信ライン６５とは別個独立に設けられている。ホストコンピュータ９０は、ホスト通信ライン８０および検査ユニット専用通信ライン７０を順に経由させて検査に必要なパラメータ等を検査ユニット１０に送信する。また、検査ユニット１０にて得られた検査データは検査ユニット専用通信ライン７０およびホスト通信ライン８０を順に経由してホストコンピュータ９０に送信される。ホストコンピュータ９０は、送信された検査データに基づいて検査対象となっている基板の良否判定を行う。

【００４２】すなわち、検査ユニット専用通信ライン７０は検査ユニット１０とホスト通信ライン８０とを接続し、検査ユニット１０とホストコンピュータ９０との間でデータ通信を行わせる回線である。そして、検査ユニット専用通信ライン７０と処理装置通信ライン６５とは別個独立に設けられ、ホストコンピュータ９０と処理ユニットまたは検査ユニット１０とは個別にデータ通信が行われるのである。なお、図３においては図示を省略しているが、検査ユニット２０についても検査ユニット１０と同様に別個独立の検査ユニット専用通信ラインにてホスト通信ライン８０と接続するようにしている。

【００４３】このようにすれば、検査ユニット１０にて得られた検査データは処理装置通信ライン６５を使用せずに検査ユニット専用通信ライン７０によって直接ホストコンピュータ９０に送信することができるため、処理装置通信ライン６５の負荷を軽減することができる。

【００４４】また、基板処理装置１側の原因によって何らかの通信障害が発生したとしても、検査ユニット専用通信ライン７０を使用して検査ユニット１０とホストコンピュータ９０との間の通信は可能であるため、検査ユニット１０の機能自体は有効に利用することができる。つまり、基板処理装置１を最低限検査装置としては使用することができる。

【００４５】また、基板処理装置の内部に検査ユニット１０および検査ユニット２０を備えているため、効率良く基板Ｗの検査を行うことができ、検査および判定終了までに要する時間を短縮して判定結果を迅速にユニット配置部ＭＰにフィードバックすることができる。

【００４６】以上、本発明の第１の実施の形態について説明したが、この発明は上記の例に限定されるものではない。例えば、基板処理システムの構成を図４のようにしても良い。図４の基板処理システムが図３と相違するのは、処理ユニットと検査ユニット１０との間でデータ通信を行うための装置内通信ライン７５を基板処理装置１内に設けている点である。なお、残余の点については図３の基板処理システムと同じである。

【００４７】図４の基板処理システムにおいては、検査ユニット１０にて得られた検査データが検査ユニット専用通信ライン７０およびホスト通信ライン８０を順に経由してホストコンピュータ９０に送信される他に、装置内通信ライン７５を経由してシステム制御部６０にも送信される。従って、検査データを基板処理装置１側で直接把握することができ、また、システム制御部６０に検査データ処理プログラムを保持させておけば、基板処理装置１内にて直接検査対象となっている基板の良否判定を行うこともできる。

【００４８】また、検査ユニット専用通信ライン７０の下に複数の検査ユニットが直列に接続されるように構成してもよい。

【００４９】また、上記第１実施形態においては、２つ

の検査ユニット（検査ユニット１０および検査ユニット２０）をインデクサＩＤの内部に配置するようにしていたが、これに限定されるものではなく、検査ユニットは１つであっても良いし、２つ以上であっても良い。また、検査ユニットの配置位置もインデクサＩＤの内部に限定されるものではなく、ユニット配置部ＭＰやインターフェイスＩＦＢの内部であっても良いし、基板処理装置の外部に付設するようにしても良い。そして、各検査ユニットは、レジストの膜厚を測定する膜厚測定、パターンの線幅を測定する線幅測定、パターンの重ね合わせを測定する重ね合わせ測定およびマクロ欠陥検査のうちの少なくとも１種類以上の検査を行う検査ユニットとすれば良い。

【００５０】また、上記第１実施形態においては、インデクサＩＤの移載ロボットＴＦに１本の移載アームを備えるいわゆるシングルアームとしていたが、２本の移載アームを備えるいわゆるダブルアームの形態としても良い。インデクサＩＤに検査ユニットを備えると、従来よりも当然に移載ロボットＴＦのアクセス頻度が多くなるため、２本の移載アームを備える移載ロボットＴＦとする方が、基板Ｗの搬送効率が向上し、基板処理装置のスループットが向上する。

【００５１】また、上記第１実施形態においては、基板処理装置を基板にレジスト塗布処理および現像処理を行う装置とし、検査ユニットの機能はいわゆるフォトリソグラフィに関連する検査を行う形態としていたが、本発明にかかる技術はこれに限定されるものではない。例えば、検査ユニットとしてはアミンまたはアンモニア濃度を測定する検査機能を備えたものを採用するようにしても良い。また、基板に付着したパーティクル等を除去する基板処理装置（いわゆるスピンスクラバ等）にパーティクル検査を行う検査ユニットを配置するようにしても良い。また、基板にＳＯＤ(Spin-on-Dielectronics)を塗布して層間絶縁膜を形成する装置に、その層間絶縁膜の焼成状態を検査する検査ユニットを配置するようにしても良い。さらに、他の基板処理装置にて処理された基板を搬入して、その検査を行った後に検査結果を処理条件にフィードフォワードするような基板処理装置に検査ユニットを配置するようにしても良い。いずれの場合であっても、検査ユニットとホスト通信ライン８０と接続する検査ユニット専用通信ラインを処理装置通信ライン６５とは別個独立に設けておくようにすれば、検査データは処理装置通信ライン６５を使用せずに検査ユニット専用通信ラインによって直接ホストコンピュータ９０に送信することができるため、処理装置通信ライン６５の負荷を軽減することができる。

【００５２】＜２．第２実施形態＞次に、本発明の第２実施形態について説明する。図５は、第２実施形態の基板処理システムを示すブロック図である。第１実施形態では、基板Ｗにレジスト塗布処理および現像処理を行う

装置に検査ユニット１０，２０を搭載した基板処理装置１をホストコンピュータ９０に接続する形態としていたが、第２実施形態では基板Ｗの洗浄処理を行う装置に灰化処理を行うプラズマアッシャを搭載した基板処理装置１ａをホストコンピュータ９０に接続している。

【００５３】ホストコンピュータ９０の構成は第１実施形態と同じであるため、同一の要素については同一の符号を付してその説明は省略する。通信部９５にホスト通信ライン８０が接続されている点も同じである。

【００５４】図６は、基板処理装置１ａの構成を示す平面図である。図７は、図６のＶ－Ｖ線に沿って見た断面図である。なお、図６および図７にもそれらの方向関係を明確にするため必要に応じてＺ軸方向を鉛直方向とし、ＸＹ平面を水平面とするＸＹＺ直交座標系を付している。この基板処理装置１ａは、基板にアッシングを行った後、引き続いてその基板に対して洗浄処理を行う装置である。基板処理装置１ａは、インデクサＩＤＡと、洗浄処理部１１０と、灰化処理部１２０と、搬送ロボットＴＲと、反転部１５０とを備えている。

【００５５】インデクサＩＤＡは、複数枚の基板を収納可能なキャリアＣを載置するとともに移載ロボットＴＦを備え、未処理基板を当該キャリアＣから取り出して搬送ロボットＴＲに払い出すとともに処理済基板を搬送ロボットＴＲから受け取ってキャリアＣに収容する。それぞれのキャリアＣには、多段の収納溝が刻設されており、それぞれの溝には１枚の基板Ｗを水平姿勢にて（主面を水平面に沿わせて）収容することができる。従って、各キャリアＣには、複数の基板Ｗ（例えば２５枚）を水平姿勢かつ多段に所定の間隔を隔てて積層した状態にて収納することができる。なお、第２実施形態のキャリアＣの形態としては、基板Ｗを密閉空間に収納するＦＯＵＰ(front opening unified pod)を採用しているが、これに限定されるものではなく、ＳＭＩＦ(Standard Mechanical Inter Face)ポッドや収納基板Ｗを外気に曝すＯＣ(open casette)であっても良い。

【００５６】各キャリアＣの正面側（図中（－Ｘ）側）には蓋が設けられており、当該蓋は基板Ｗの出し入れを行えるように着脱可能とされている。キャリアＣの蓋の着脱は、図示を省略するポッドオープナーによって行われる。キャリアＣから蓋を取り外すことにより当該蓋部分が基板通過可能な開口部となる。キャリアＣに対する基板Ｗの搬入搬出はこの開口部を介して行われる。なお、キャリアＣのインデクサＩＤＡへの載置およびインデクサＩＤＡからの搬出は、通常ＡＧＶ(Automatic Guided Vehicle)やＯＨＴ(over-head hoist transport)等によって自動的に行うようにしている。

【００５７】移載ロボットＴＦは、第１実施形態と同様に、移載アーム１７５を３次元的に移動させることができる。従って、移載ロボットＴＦは、各キャリアＣから未処理の基板Ｗを取り出して搬送ロボットＴＲに渡すこ

とと、処理済みの基板Ｗを搬送ロボットＴＲから受け取っていずれかのキャリアＣに収容することができる。

【００５８】洗浄処理部１１０と灰化処理部１２０とは搬送ロボットＴＲが配置された搬送路１０９を挟んで対向配置されている。また、搬送路１０９の一端部はインデクサＩＤＡと接触し、他端部には反転部１５０が配置されている。

【００５９】洗浄処理部１１０は、表面スクラバーＳＳおよび裏面スクラバーＳＳＲをそれぞれ一つずつ備える。表面スクラバーＳＳは、基板Ｗの表面（デバイス面）を上側に向けて水平面内にて基板Ｗを回転させつつその表面にリンス液（純水）を吐出して洗浄ブラシを当接または近接させることによって表面洗浄処理を行う。表面スクラバーＳＳは、基板Ｗの裏面（デバイス面とは反対側の面）を真空吸着するいわゆるバキュームチャックを採用している。

【００６０】一方、裏面スクラバーＳＳＲは、基板Ｗの裏面を上側に向けて水平面内にて基板Ｗを回転させつつその裏面にリンス液（純水）を吐出して洗浄ブラシを当接または近接させることによって裏面洗浄処理を行う。裏面スクラバーＳＳＲは、デバイス面を吸着保持することができないため、基板Ｗの周縁部を把持するいわゆるメカチャックを採用している。

【００６１】図７には裏面スクラバーＳＳＲの一部構成を示している。回転ベース１１１の上面には複数のピン１１２が立設されている。ピン１１２は保持される基板Ｗの外周に沿って配置されており、図示を省略する開閉機構によって基板Ｗに対して開閉することができるようにされている。すなわち、ピン１１２が基板Ｗの周縁に対して接離するように構成されている。複数のピン１１２が基板Ｗの周縁部に接して押圧することにより、当該基板Ｗは回転ベース１１１に水平姿勢にて保持される。一方、複数のピン１１２が基板Ｗの周縁部から離間した開放姿勢をとることにより、回転ベース１１１から基板Ｗを取り出すことが出来るとともに、回転ベース１１１に新たな基板Ｗを渡すことができる。

【００６２】回転ベース１１１は鉛直方向に沿った回転軸を中心として回転自在にモータ１１３に支持されている。回転ベース１１１に基板Ｗを保持させた状態にてモータ１１３が回転ベース１１１を回転させることにより基板Ｗは水平面内にて回転することとなる。

【００６３】また、裏面スクラバーＳＳＲには洗浄ブラシ１１４と純水吐出ノズル１１６とが設けられている。純水吐出ノズル１１６は、図外の純水供給源と連通接続されている。洗浄ブラシ１１４はブラシアーム１１５の先端に取り付けられている。ブラシアーム１１５は図外の駆動機構によって昇降することと、水平面内にて揺動することとが可能とされている。基板Ｗの裏面洗浄処理を行うときには、基板Ｗを回転させるとともに、その基板Ｗの上面（裏面）に純水吐出ノズル１１６からリンス液として純水を吐出しつつ洗浄ブラシ１１４を基板Ｗの裏面に当接または近接させた状態で、ブラシアーム１１５を揺動させることによって、基板Ｗの裏面に付着したパーティクル等の汚染物質を除去する。なお、表面スクラバーＳＳもバキュームチャックを採用している点を除いては裏面スクラバーＳＳＲと同様の構成を有している。

【００６４】灰化処理部１２０は、アッシングユニットＡＳＨにクールプレートＣＰを内蔵させて構成されている。アッシングユニットＡＳＨは、プレート１２１（図７）を内包する処理室と、その処理室内を真空排気する真空システムと、処理室に酸素等の処理ガスを供給する処理ガス供給機構と、高周波電界を印加してプラズマを形成するプラズマ形成機構とを備えている。このような構成により、アッシングユニットＡＳＨは、プレート１２１上に基板Ｗを載置した状態でその周辺を真空にして酸素プラズマによりアッシング（灰化処理）を行うことができる。なお、アッシングとは炭素、酸素、水素からなる有機物であるレジストを酸素プラズマによって気化するレジスト剥離処理である。

【００６５】アッシングユニットＡＳＨに内蔵されたクールプレートＣＰは、プレートに載置した基板Ｗをペルチェ素子または恒温水循環によって所定温度まで冷却する。ここでのクールプレートＣＰは、アッシングによって昇温した基板Ｗを洗浄処理可能な温度にまで冷却するためのものである。

【００６６】図７に示すように、搬送路１０９を挟んで洗浄処理部１１０と灰化処理部１２０とが同一の高さ位置に対向配置されている。なお、搬送路１０９、洗浄処理部１１０および灰化処理部１２０の下方空間は液配管や電気配線を収納するキャビネットとして機能している。

【００６７】洗浄処理部１１０と灰化処理部１２０とに挟み込まれた搬送路１０９の中央部には搬送ロボットＴＲが配置されている。搬送ロボットＴＲは第１実施形態と同じである。よって、搬送ロボットＴＲがインデクサＩＤ、洗浄処理部１０、灰化処理部２０および反転部５０の間で基板Ｗの受け渡しを行うことにより当該基板Ｗにアッシングおよび洗浄処理を行わせることができる。

【００６８】搬送路１０９の端部に配置された反転部１５０は、２つの反転ユニットＲＥＶ１，ＲＥＶ２を２段に積層して構成されている。反転ユニットＲＥＶ１，ＲＥＶ２は、いずれも基板Ｗの周縁部を把持して基板の上下面を反転させることが可能に構成されている。反転ユニットＲＥＶ１，ＲＥＶ２は同様の機能を有するものであるが、本実施形態では反転ユニットＲＥＶ１が基板Ｗの裏面を上面に向けるために使用され、反転ユニットＲＥＶ２が基板Ｗの表面を上面に向けるために使用される。

【００６９】ここで、第２実施形態の基板処理装置１ａ

での処理内容について簡単に説明しておく。半導体の製造工程においてレジスト膜にパターン形成を行ってからイオン注入を行った後、レジスト膜は不要となるためレジスト剥離処理が行われる。このようなレジスト剥離のための処理がアッシングである。アッシングは、有機物であるレジストを酸素プラズマによって気化する処理である。ところが、実際のレジストには重金属などの気化しない不純物も多少含まれており、アッシング後の基板にはこれらの残存物質がパーティクルとして付着している。このため、アッシング後の基板に対しては洗浄処理を行う。この後、保護膜の形成等を行い、最終的な製品として仕上げるのである。

【００７０】半導体の製造工程のうち第２実施形態の基板処理装置１ａが行うのはアッシングおよび洗浄処理である。つまり、基板処理装置１ａは、洗浄処理とその直前の処理工程である灰化処理とを連続して行うものである。

【００７１】基板処理装置１ａにおける処理の一例についてさらに説明すると、基板処理装置１ａはアッシングとその直後の洗浄処理とを行う装置であり、イオン注入後の不要なレジスト膜が付着したままの基板Ｗが未処理基板として複数枚キャリアＣに収容された状態で基板処理装置１ａのインデクサＩＤＡに搬入される。

【００７２】次に、インデクサＩＤＡの移載ロボットＴＦがキャリアＣから１枚の未処理基板Ｗを取り出して搬送ロボットＴＲに渡す。搬送ロボットＴＲは、インデクサＩＤＡから渡された基板Ｗを灰化処理部１２０のアッシングユニットＡＳＨに搬入する。アッシングユニットＡＳＨは、プレート１２１上に枚葉状態で基板Ｗを載置してアッシングを行う。アッシング後の基板Ｗはそのまま洗浄するには温度が高すぎるため、搬送ロボットＴＲによってクールプレートＣＰに移され、冷却される。

【００７３】その後、基板Ｗは搬送ロボットＴＲによって灰化処理部１２０から反転部１５０の反転ユニットＲＥＶ１に搬入される。反転ユニットＲＥＶ１は基板Ｗの上下面を反転させて裏面を上面にする。上下反転された基板Ｗは枚葉状態のまま搬送ロボットＴＲによって洗浄処理部１１０の裏面スクラバーＳＳＲに搬入される。裏面スクラバーＳＳＲは、基板Ｗの裏面のスクラブ洗浄を行う。アッシング時に生じたパーティクルが基板Ｗの裏面に回り込んで付着することがあり、裏面スクラバーＳＳＲはそのようなパーティクルを除去するのである。

【００７４】裏面洗浄の後、基板Ｗは搬送ロボットＴＲによって洗浄処理部１１０から反転部１５０の反転ユニットＲＥＶ２に搬入される。反転ユニットＲＥＶ２は基板Ｗの上下面を反転させて表面を上面にする。上下反転された基板Ｗは枚葉状態のまま搬送ロボットＴＲによって洗浄処理部１１０の表面スクラバーＳＳに搬入される。表面スクラバーＳＳは、基板Ｗの表面のスクラブ洗浄を行う。基板Ｗの表面にはアッシング後の残存物質がパーティクルとして付着しており、表面スクラバーＳＳはそのようなパーティクルを除去する。

【００７５】表面洗浄の後、基板Ｗは搬送ロボットＴＲによって洗浄処理部１１０から再びインデクサＩＤＡに戻される。すなわち、処理済の基板Ｗは搬送ロボットＴＲからインデクサＩＤＡの移載ロボットＴＦに渡され、移載ロボットＴＦがその基板Ｗをキャリア Ｃに収納する。やがて、複数枚の処理済の基板Ｗが収納されたキャリアＣは基板処理装置１ａのインデクサＩＤから搬出されることとなる。

【００７６】なお、上記は基板処理装置１ａにおける処理の一例であり、例えば先に表面洗浄を行ってから裏面洗浄を行うようにしても良い。

【００７７】以上のように、本実施形態では、洗浄処理部１１０および灰化処理部１２０を１つの基板処理装置１ａに一体化して組み込んでいる。すなわち、基板処理装置１ａは従来別個独立した装置であった洗浄装置とプラズマアッシャとを一体化したものである。機械的なハードウェア構成を一体化しても、ソフトウェアの一体化、つまり統合制御ソフトウェアの再構築が困難であることは既述した通りである。このため、第２実施形態では第１実施形態と同様に、洗浄処理部１１０および灰化処理部１２０のそれぞれとホスト通信ライン８０とを相互に別個独立に接続し、洗浄処理部１１０および灰化処理部１２０のそれぞれとホストコンピュータ８０との間で個別にデータ通信を行わせている。

【００７８】すなわち、図５に示すように、ホスト通信ライン８０と基板処理装置１ａの洗浄処理部１１０の制御部１３１とは洗浄装置通信ライン１６５（第１通信ライン）にて接続されている。第２実施形態の基板処理システムにおいて基板処理装置１ａに基板処理を実行させるときには、あるロットについて適用されるフローレシピにしたがってホストコンピュータ９０がホスト通信ライン８０および洗浄装置通信ライン１６５を順に経由して洗浄処理部１１０の制御部１３１に指令を送信する。「フローレシピ」とは上述したような基板Ｗの処理手順および処理条件を記述したものである。

【００７９】制御部１３１は、ホストコンピュータ９０から送信されてきた指令に従って洗浄処理部１１０を構成する各機構（例えば裏面スクラバーＳＳＲのモータ１１３）並びにインデクサＩＤＡ、搬送ロボットＴＲおよび反転部１５０を制御し、一連の洗浄処理を基板Ｗに対して行わせる。また、制御部１３１は、基板処理装置１ａに含まれる処理部のうち灰化処理部１２０以外の処理部の装置情報、例えば裏面スクラバーＳＳＲにおける実際の洗浄時間や基板Ｗの回転数等を取得する。取得された装置情報は制御部１３１から洗浄装置通信ライン１６５およびホスト通信ライン８０を順に経由してホストコンピュータ９０に送信される。

【００８０】すなわち、洗浄装置通信ライン１６５は洗

浄処理部１１０とホスト通信ライン８０とを接続し、洗浄処理部１１０とホストコンピュータ９０との間でデータ通信を行わせる回線である。

【００８１】一方、ホスト通信ライン８０と基板処理装置１ａの灰化処理部１２０の制御部１３２とは灰化処理装置通信ライン１７０（第２通信ライン）にて接続されている。灰化処理装置通信ライン１７０と洗浄装置通信ライン１６５とは別個独立に設けられている。ホストコンピュータ９０は、ホスト通信ライン８０および灰化処理装置通信ライン１７０を順に経由させてフローレシピにしたがった指令や灰化処理に必要なパラメータ等を灰化処理部１２０に送信する。

【００８２】また、ホストコンピュータ９０は、基板処理装置１ａに含まれる処理部のうち灰化処理部１２０以外の処理部と灰化処理部１２０との同期調整を行う。例えば、搬送ロボットＴＲが基板Ｗを灰化処理部１２０のアッシングユニットＡＳＨに搬入するときに、ホストコンピュータ９０は灰化処理部１２０の制御部１３２にアッシングの開始を指示する。逆に、灰化処理部１２０での所定の処理が完了されるときに、ホストコンピュータ９０は洗浄処理部１１０の制御部１３１に洗浄処理の開始を指示する。制御部１３１，１３２はホストコンピュータ９０の同期調整に従って、それぞれが独自の動作制御、つまり洗浄処理のための動作制御（インデクサＩＤ、洗浄処理部１１０、搬送ロボットＴＲおよび反転部１５０の制御）とアッシングのための動作制御（灰化処理部１２０の制御）とを行う。

【００８３】また、制御部１３２は灰化処理部１２０の装置情報、例えば処理室内の真空度や印加電圧を取得する。取得された装置情報は制御部１３２から灰化処理装置通信ライン１７０およびホスト通信ライン８０を順に経由してホストコンピュータ９０に送信される。ホストコンピュータ９０は、制御部１３１，１３２から伝達された基板処理装置１ａに関する装置情報をデータベースとして磁気ディスク９４等に格納しておく。

【００８４】すなわち、灰化処理装置通信ライン１７０は灰化処理部１２０とホスト通信ライン８０とを接続し、灰化処理部１２０とホストコンピュータ９０との間でデータ通信を行わせる回線である。そして、灰化処理装置通信ライン１７０と洗浄装置通信ライン１６５とは別個独立に設けられ、ホストコンピュータ９０と洗浄処理部１１０および灰化処理部１２０とは個別にデータ通信が行われるのである。

【００８５】このようにすれば、灰化処理部１２０とホストコンピュータ９０とのデータ通信は洗浄装置通信ライン１６５を使用せずに灰化処理装置通信ライン１７０によって行うことができるため、洗浄装置通信ライン１６５の負荷を軽減することができる。

【００８６】また、ホストコンピュータ９０と洗浄処理部１１０および灰化処理部１２０とを個別に接続し、ホストコンピュータ９０に灰化処理部１２０とそれ以外の処理部との同期調整を行わせれば、統合制御ソフトウェアを再構築することなく簡易な構成にて洗浄処理部１１０と灰化処理部１２０とを備えた基板処理装置１ａを運用することができる。

【００８７】また、洗浄処理の直前処理工程であるアッシングを行う灰化処理部１２０から洗浄処理を行う洗浄処理部１１０の順に共通の搬送ロボットＴＲによって基板Ｗを枚葉状態で保持したまま搬送している。このため、装置間搬送に要する無駄時間を無くすことができる。

【００８８】また、アッシング後比較的短時間にて基板Ｗの洗浄処理が行われることとなるため、アッシング後に残ったパーティクルが基板に強固には付着しておらず、洗浄処理性能を向上させることができる。

【００８９】以上、本発明の第２の実施の形態について説明したが、この発明は上記の例に限定されるものではない。例えば、第２実施形態では、洗浄装置通信ライン１６５および灰化処理装置通信ライン１７０をそれぞれホスト通信ライン８０に接続するようにしていたが、これらをそれぞれホストコンピュータ９０に直接接続するようにしても良い。図８は、第２実施形態の基板処理システムの他の例を示すブロック図である。

【００９０】図８のシステムでは、ホストコンピュータ９０の通信部９５に一つの基板処理装置１ａについて複数の通信ポートを設けるようにしている。このため、ホストコンピュータ９０の通信部９５と基板処理装置１ａの洗浄処理部１１０の制御部１３１とを洗浄装置通信ライン１６５にて直接接続するとともに、通信部９５と灰化処理部１２０の制御部１３２とを灰化処理装置通信ライン１７０にて直接接続している。すなわち、第２実施形態と同様に、灰化処理装置通信ライン１７０と洗浄装置通信ライン１６５とは別個独立に設けられ、ホストコンピュータ９０と洗浄処理部１１０および灰化処理部１２０とは個別にデータ通信が行われるのである。なお、ホストコンピュータ９０と基板処理装置１ａとの接続形態が異なる点を除いては、システム構成および処理内容ともに上記第２実施形態と同じである。

【００９１】このようにしても、灰化処理部１２０とホストコンピュータ９０とのデータ通信は洗浄装置通信ライン１６５を使用せずに灰化処理装置通信ライン１７０によって行うことができるため、洗浄装置通信ライン１６５の負荷を軽減することができる。

【００９２】また、ホストコンピュータ９０と洗浄処理部１１０および灰化処理部１２０とを個別に接続し、ホストコンピュータ９０に灰化処理部１２０とそれ以外の処理部との同期調整を行わせれば、統合制御ソフトウェアを再構築することなく簡易な構成にて洗浄処理部１１０と灰化処理部１２０とを備えた基板処理装置１ａを運用することができる。

【００９３】また、第２実施形態においては、洗浄処理部１１０と灰化処理部１２０とを１つの基板処理装置１ａに組み込むようにしていたが、洗浄処理は半導体等の製造工程において複数回行うものであり、洗浄処理部１１０と他の処理部とを１つの装置内に組み込むようにしても良い。例えば、酸化膜の成膜を行う成膜処理部、基板のエッチングを行うエッチング処理部等と洗浄処理部と一体化して１の装置内に組み込むようにしても良い。すなわち、基板の洗浄処理を行う洗浄処理部と、洗浄処理の直前処理工程に該当する処理を行う前処理部とを一体化して１の装置内に組み込み、それらのそれぞれとホストコンピュータ９０とを別個独立の通信ラインにてそれぞれ接続するようにすれば、第２実施形態と同様に、簡易な構成にて異なる処理を行う複数の処理部を備えた基板処理装置を運用することができる。

【００９４】また、洗浄処理部と洗浄処理の直前処理工程を実行する処理部とを一体化して基板処理装置１ａに組み込むことに限定されるものではなく、それぞれが基板に連続しない異なる処理を行う複数の処理部を一体化して基板処理装置１ａに組み込むようにしても良い。

【００９５】さらに、第２実施形態においては、洗浄処理部１１０を洗浄ブラシによって機械的な洗浄を行うスピンスクラバーとしていたが、これに限定されるものではなく、超音波を付与した純水を基板に吹き付けることによって洗浄を行うユニット、高圧の純水を基板に吹き付けることによって洗浄を行うユニット、液相に気相を混合して基板に吹き付けることによって洗浄を行うユニット等によって洗浄処理部を構成するようにしても良い。

【００９６】

【発明の効果】以上、説明したように、請求項１の発明によれば、検査部とホスト通信ラインとを接続し、検査部とホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、第１通信ラインとは別個独立に処理部とホスト通信ラインとを接続し、処理部とホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えるため、検査部が取得した検査データは第２通信ラインを使用せずに第１通信ラインによって直接ホストコンピュータに送信することができ、基板処理装置と外部との間の通信ライン負荷を軽減することができる。

【００９７】また、請求項２の発明によれば、処理部と検査部との間でデータ通信を行うための装置内通信ラインを基板処理装置内に設けるため、検査部が取得した検査データを基板処理装置にて直接把握することができる。

【００９８】また、請求項３の発明によれば、検査部と装置外部との間でデータ通信を行うための第１通信ラインと、第１通信ラインとは別個独立に設けられ、処理部と装置外部との間でデータ通信を行うための第２通信ラインと、を備えるため、検査部が取得した検査データは第２通信ラインを使用せずに第１通信ラインによって直接装置外部に送信することができ、基板処理装置と外部との間の通信ライン負荷を軽減することができる。

【００９９】また、請求項４の発明によれば、処理部と検査部との間でデータ通信を行うための装置内通信ラインを備えるため、検査部が取得した検査データを基板処理装置にて直接把握することができる。

【０１００】また、請求項５の発明によれば、複数の処理部のそれぞれとホスト通信ラインとを相互に別個独立に接続し、複数の処理部のそれぞれとホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えるため、複数の処理部全体を制御するための統合制御ソフトウェアを再構築することなく簡易な構成にて異なる処理を行う複数の処理部を備えた基板処理装置を運用することができる。

【０１０１】また、請求項６の発明によれば、洗浄部とホスト通信ラインとを接続し、洗浄部とホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、第１通信ラインとは別個独立に灰化処理部とホスト通信ラインとを接続し、灰化処理部とホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えるため、簡易な構成にて洗浄部と灰化処理部とを備えた基板処理装置を運用することができる。

【０１０２】また、請求項７の発明によれば、複数の処理部のそれぞれとホストコンピュータとを相互に別個独立に接続し、複数の処理部のそれぞれとホストコンピュータとの間で個別にデータ通信を行わせる複数の通信ラインを備えるため、複数の処理部全体を制御するための統合制御ソフトウェアを再構築することなく簡易な構成にて異なる処理を行う複数の処理部を備えた基板処理装置を運用することができる。

【０１０３】また、請求項８の発明によれば、洗浄部とホストコンピュータとを接続し、洗浄部とホストコンピュータとの間でデータ通信を行わせる第１通信ラインと、第１通信ラインとは別個独立に灰化処理部とホストコンピュータとを接続し、灰化処理部とホストコンピュータとの間でデータ通信を行わせる第２通信ラインと、を備えるため、簡易な構成にて洗浄部と灰化処理部とを備えた基板処理装置を運用することができる。

【図面の簡単な説明】

【図１】本発明に係る基板処理装置全体の概略を示す斜視図である。

【図２】図１の基板処理装置の概略構成を示す平面図である。

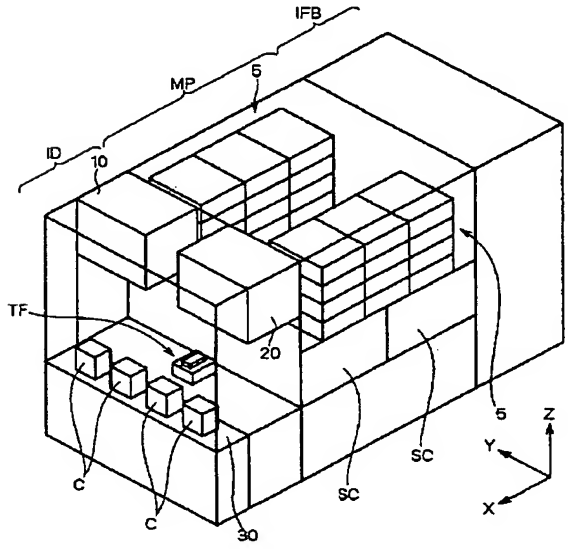
【図３】本発明に係る基板処理システムの一例を示すブロック図である。

【図４】本発明に係る基板処理システムの他の例を示すブロック図である。

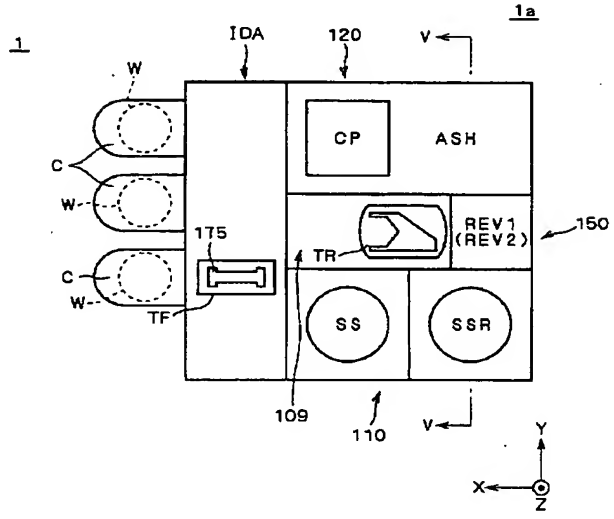
【図５】第２実施形態の基板処理システムを示すブロッ

ク図である。
【図６】第２実施形態の基板処理装置の構成を示す平面図である。
【図７】図６のＶ－Ｖ線に沿って見た断面図である。
【図８】第２実施形態の基板処理システムの他の例を示すブロック図である。
【符号の説明】
１，１ａ　基板処理装置
１０，２０　検査ユニット
７０　検査ユニット専用通信ライン
７５　装置内通信ライン
８０　ホスト通信ライン
９０　ホストコンピュータ
＊１１０　洗浄処理部
１２０　灰化処理部
１６５　洗浄装置通信ライン
１７０　灰化処理装置通信ライン
ＡＳＨ　アッシングユニット
Ｃ　キャリア
ＩＤ，ＩＤＡ　インデクサ
ＳＳ　表面スクラバー
ＳＣ　塗布処理ユニット
ＳＤ　現像処理ユニット
ＳＳＲ　裏面スクラバー
ＴＲ　搬送ロボット
＊　Ｗ　基板

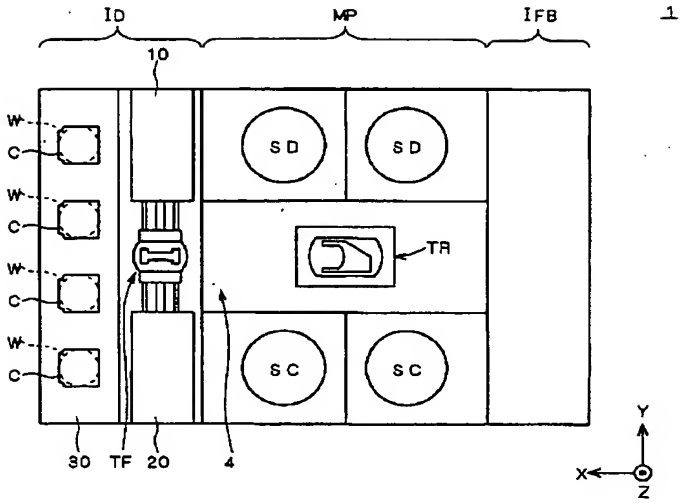
【図１】



【図６】



【図２】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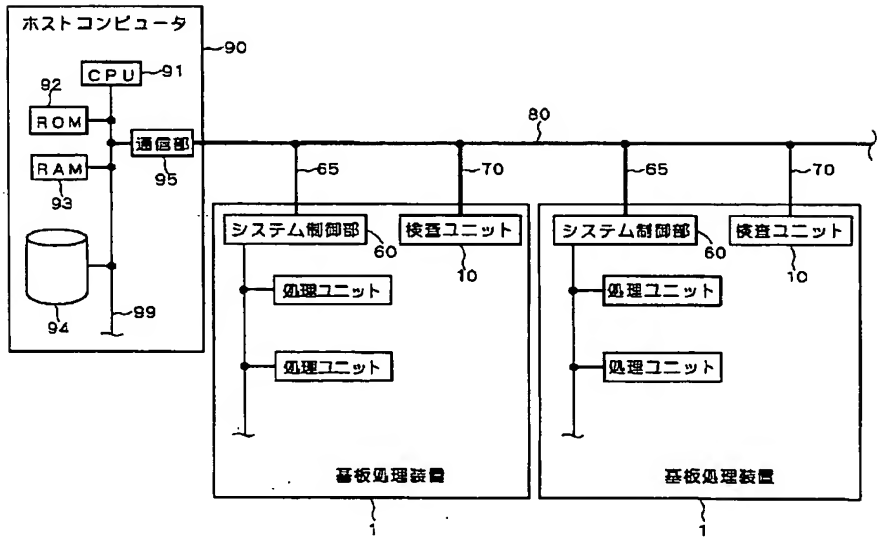
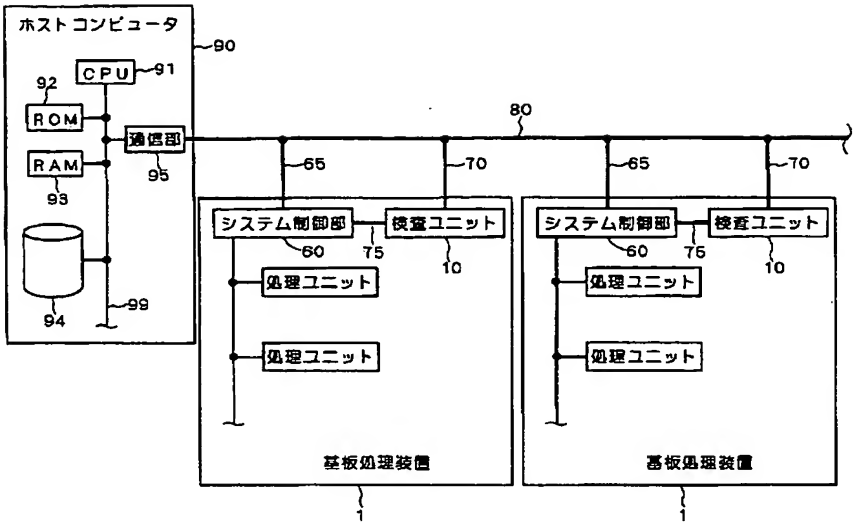
MP
IFB
1
10
W
C
SD
SD
TR
SC
SC
Y
X
Z
30
TF
20
4

【図３】


ホストコンピュータ
90
CPU
91
92
ROM
RAM
93
通信部
95
94
99
80
65
70
65
70
システム制御部
60
検査ユニット
10
処理ユニット
処理ユニット
基板処理装置
1
システム制御部
60
検査ユニット
10
処理ユニット
処理ユニット
基板処理装置
1

【図４】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ROM
通信部
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RAM
93
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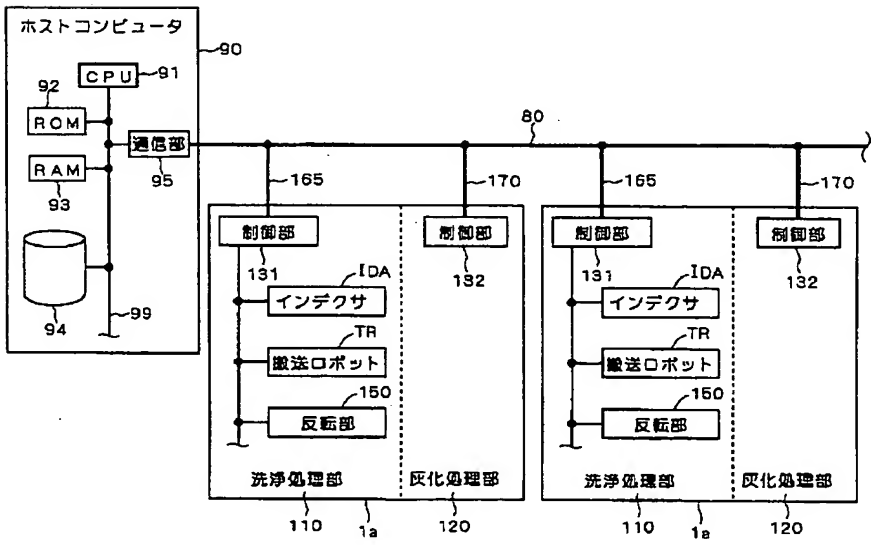
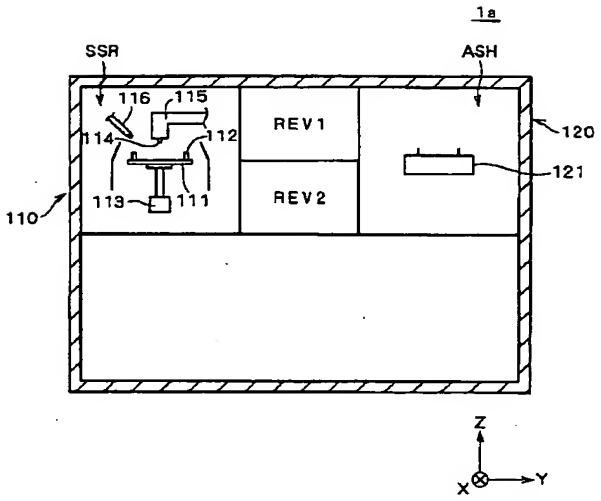
99
80
65
70
65
70
システム制御部
60
75
検査ユニット
10
処理ユニット
処理ユニット
基板処理装置
1
システム制御部
60
75
検査ユニット
10
処理ユニット
処理ユニット
基板処理装置
1

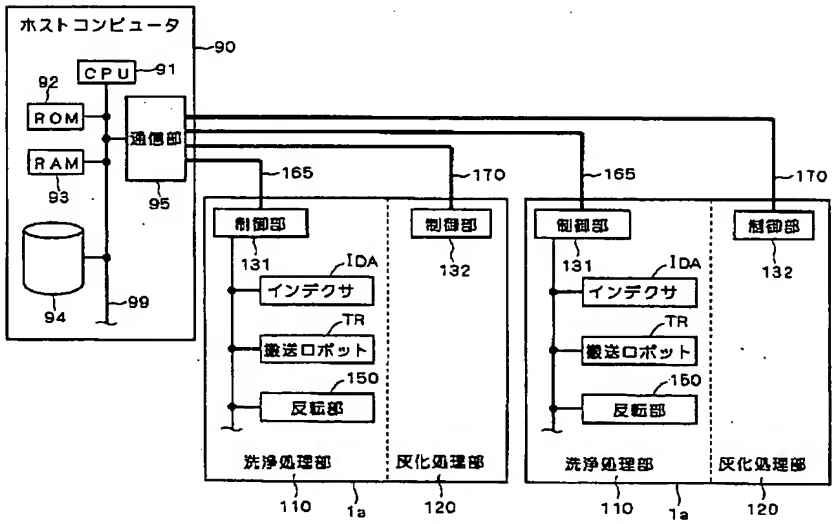
【図５】


ホストコンピュータ
90
CPU
91
92
ROM
通信部
95
RAM
93
94
99
80
165
170
165
170
制御部
131
IDA
インデクサ
TR
搬送ロボット
150
反転部
洗浄処理部
110
1a
制御部
132
反化処理部
120
制御部
131
IDA
インデクサ
TR
搬送ロボット
150
反転部
洗浄処理部
110
1a
制御部
132
反化処理部
120

【図７】



【図８】



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